Of the Use of the Tables for the Centuries according to the O.S.

These Tables with the written additions contain one compleat Dionysian Period.

So that, if any given Year of Christ either past or to come, wch is not in the Tables, be either encreased or diminished by 532, or some one of its multiples, till the Sum or Remainder comes within the Extent of the Tables; the Sunday Letter, the Epact, and Easter day are given by the Tables for that Year of Christ, according to the O.S.

N.B. Those years of Christ wch are past, are set down in the Margin for every ten Years.

For years after 2000. subtract 532.1064.1596.2128.2660.3192.&c.

To find the Number of Days by which the Styles differ. (See the Tables. p. 49, or compute thus:)

From the Number of Hundreds in the date of the year, Subtract its fourth part, not regarding Fractions, the Residue lessned by 2. is the Number required.

To find the Gregorian Dominical Letter.

Divide the Year, its fourth & 4. by Seven. Subtract what remains from the Number of days by wch the Stiles differ; the Number that is left, (casting away 7. if need be) is the Index of the Dominical Letter. 1. A. 2. B. 3. C. &c (See also pag. 132

The Table for finding the Epacts N.S

from the Epacts O.S.

1600	10
1700.1800	11
1900.2000.2100	12
2200.2400	13
2300.2500	14
2600 2700.2800	15
2900.3000	16
3100.3200.3300	17
3400.3600	18
3500.3700	19
3800.3900.4000	20
4100.	21
4200.4300.4400	22
4500.4600	23
4700.4800.4900	24
5000.5200	25
5100.5300	26
5400.5500.5600	27
5700 5800	28
5900 6000 6100	29
6200.6400	0
6300.6500	1
6600 6800	2
6700 6900	3
7000.7100 7200	4
&c.	

The Rule:

From the Epact. O.S. adding. 30. if need be, Subtract the Numb.r in this Table over ag.t the Hundreds in ye Date of the Year, the Remainder is the Epact N.S.

NB. If the Gold.n N.o exceeds 11. write the Epact 25 thus: otherwise XXV.

A Table for finding the Epacts N.S. from the Golden N.°

1600			20
1700	18		19
19	20	21	18
	22	24	17
	23	25	16
26	27	28	15
29	30		14
31	32	33	13
34	36		12
	35	37	11
38	39	40	10
	41		9
42	43	44	8
45	46		7
47	48	49	6
50		52	5
	51	53	4
54	55	56	3
	57	58	2
59	60	61	1
62		64	0
	63	65	29
66	68		28
	67	69	27

By this Table the Epact for the new Stile may also be found from y.^e Golden Number thus:

To the product of the Golden Numb.^r multiplied by 11. add the Number in this Table w.^{ch} stands over against the Hundreds in the Date of the given Year divide the Sum by 30 the Remainder is the Epact N.S.

If the Golden Number is under 12. the Epact 25 must be writ thus [XXV if it be 12. or more it must be written thus [2

Table to find the Sunday Letter N.5

	0	1	2	3	4	5	6
Leap year	GF	DC	AG	ED	BA	FE	CB
1 after	A	E	B	F	C	G	D
2 after	C	G	D	A	E	B	F
3 after	E	B	F	C	G	D	A
	1500 1600	1700	1800	1900 2000	2100	2200	2300 2400
	2500	2600	2700 2800	2900	3000	3100 3200	3300
	3400	3500 3600	3700	3800	3900 4000	4100	4200
	4300 4400	4500	4600	4700 4800	4900	5000	&c

To the Date of the Year add twice the Number w.ch stands at y.e Top of tha[t] Column, in w.ch the Number of Hundreds in the Date of the Year is found. Divide the Sum by 7. and seek the remainde[r] either number or Cypher in y.e uppermost L[ine] the Sunday Letter is found under it, over against the given year's distance from Leap y[ear]

W. Palmer

TABLES

OF

TIME;

WHEREBY

The *Day* of the *Month*, either *New* or *Old Stile*;
Day of the *Week*;
Rising of the *Sun*;
Time of the SUN's Entrance into the *Equinoxes* and *Solstices*;
Moveable Feasts, particularly true Time of EASTER;
Fix'd FEASTS;
Remarkable *Times*;
MOON's *Age*;
ECLIPSES, &c. may be found for any Time past, or to come, without the Help of *Astronomical Tables*.
N. B. There are 500 *Years*, viz. 250 past, and 250 to come, ready calculated.

By *GAMALIEL SMETHURST*.

To ask or search I blame thee not; for Heav'n
Is as the Book of God before thee set:
Wherein to read his wond'rous Works and learn
His Seasons, Hours, or Days, or Months, or Years.

MILTON.

MANCHESTER:
Printed by *R. Whitworth*, Bookseller; and sold by R. *Dodsley*, at *Tully's-Head*, in *Pall-Mall*, LONDON.

THE

PREFACE.

THE following Pages, which were the Reſult of Amuſement, are not intended for thoſe who make Aſtronomy their principal Study, but to teach ſuch as do not, ſo much of it as is neceſſary in Chronolgy, and its Companion, Hiſtory; to give them a regular Series of Time, the whole Length of the *Julian Period*, thereby to diſtinguiſh each Year, and apply to it any of its Chronological Characters.

THIS Work may be of great Service to young Adventurers, in the Sciences of Aſtronomy and Chronology, by letting them gain their Point, (tho' rudely,) and thereby encourage them to make it more exact by Aſtronomical Equations.

I have avoided all Algebraical Contraction, thinking it would be going about to ſolve a leſs Difficulty by a greater, to moſt Readers, and not agreeable to the Age of Life theſe Tables are intended for, they being an Introduction only.

MY Expectations are not great: I publiſh to gratify a laudable Ambition of being in any Degree ſerviceable to the World; and if the following Tables help to clear up any dark Point in Hiſtory; to excite any one to make a Progreſs in Aſtronomy or Chronology; or to fill up thoſe vacant Hours of our Youths, with

ſome profitable Entertainment, which might otherwiſe have been ſpent much worſe, I ſhall have my Deſire.

THE

CONTENTS.

Of

To

O F

OF THE

JULIAN Period

AND

JULIAN Year.

THE following Tables are ſuited to the *Julian* Period of Time, (invented by *Scaliger*) ſo call'd becauſe it is compoſed of *Julian* Years.

The *Julian* Year conſiſts of 365 Days, 6 Hours; the odd Hours added together amount every 4th Year to a Day, for which Reaſon 3 Years ſucceſſively are each compos'd of 365 Days, and the 4th of 366 Days.

This Form of Years was firſt ſettled by *Julius Cæſar*, from whom 'tis called *Julian*, 45 Years before Chriſt, and by him order'd to be obſerv'd throughout the whole *Roman* Empire. *Britain*, being then a *Roman* Province, received this Account, which it has ever ſince kept, and is commonly call'd *Old Stile*.

The *Julian* Period conſiſts of 7980 of theſe Years, ariſing from the Multiplication of 3 accepted Cycles, which are ſtill us'd. Theſe are the Cycle of the Sun, 28 multiply'd by the Golden Number, or Cycle of the Moon 19, gives 532, or the *Victorian* Period; which multiply'd

by the *Roman* Indiction 15, makes 7980, the Number of Years in the *Julian* Period.

Cycle of the Sun	28
Golden Number	19
	252
	28
Dionysian or Victorian Period	532
Roman Indiction	15
	2660
	532
Julian Period	7980

This Period was invented to fix a true Standard of Time, and measure from one Epocha to another. The Beginning of which, that is when the Cycle of the Sun was 1, the Golden Number 1, and the Roman Indiction 1, was suppos'd before the Creation of the World, according to Archbishop *Usher*, 710 Years, before the vulgar Birth of Christ 4713 Years; so that adding 4713 to the Year of our Lord, you will have the Year of the *Julian* Period at any Time, and from any given Year in the *Julian* Period substracting 4713, the Remainder shews the Year of Christ.

EXAMPLE I.

What Year of the *Julian* Period is the Year of Christ 1749?

Year of our Lord	1749
Add	4713
Year of the *Julian* Period sought	6462

EXAMPLE

EXAMPLE II.

What Year of our Lord was the 4714th Year of the *Julian* Period?

Year of the *Julian* Period	4714
Substract	4713
Year of Christ	1

The Remainder is one, which shews you that the 4714th Year of the *Julian* Period was the first Year of Christ.

EXAMPLE III.

What Year of the *Julian* Period was that, when *Julius Cæsar* reform'd the Calendar, being 45 Years before Christ?

First Year of Christ was the Year of the *Julian* Period	4714
From which take	45
Year of the *Julian* Period required	4669

EXAMPLE IV.

It is required how many Years before Christ was the Year of the *Julian* Period 3938?

First Year of Christ was the Year of the *Julian* Period	4714
From which take	3938
Years before Christ	776

This was the Year the Olympiads began amongst the Greeks.

EXAMPLE V.

What Year of the *Julian* Period will the Year of our Lord 2000 be?

Year of our Lord	2000
Add	4713
Year of the *Julian* Period sought	6713

Of the *Cycles* which constitute this Period.

Of the CYCLE *of the* SUN, *with the* DOMINICAL LETTERS.

THE Cycle of the Sun is a Revolution of 28 *Julian* Years, caus'd by the so often changing the Dominical or Sunday Letters. The Dominical Letters, or Marks for the Beginning of the Year, are as follow.

When Sunday is the first Day of the Year it is	*A.*
When Sunday is the second Day of the Year it is	*B.*
Sunday 3d Day of the Year	*C.*
Sunday 4th Day of the Year	*D.*
Sunday 5th Day of the Year	*E.*
Sunday 6th Day of the Year	*F.*
Sunday 7th Day of the Year	*G.*

So when the Dominical Letter is *G*, Sunday is the 7th Day of the Year, and of Course the First must be Monday.

Monday.	Tues.	Wed.	Thur.	Fri.	Sat.	Sunday.
G	*F*	*E*	*D*	*C*	*B*	*A*
7th	6th	5th	4th	3d	2d	1st.

The Year, consisting of 365 Days, which divided by 7, the Number of Days in a Week, makes a Remainder of one. This changeth the Dominical Letters 7 Times. Then to every 4th Year, which is called Leap Year, a Day being added for the 6 Hours, which the Julian Year

Year accounted more than 365 Days, causes the Alteration of the 7 Dominical Letters 4 Times, and that makes 28, the Number of Years in the Solar Cycle as may be seen in Table I. with their Dominical Letters in their proper Order.

When there are 2 Dominical Letters it is then Leap Year, the first of which is the Dominical Letter for *January* and *February*, and the other for the rest of the Year.

EXAMPLE VI.

Suppose the Cycle of the Sun 22. I want to know the Dominical Letter. Look in Table I. for 22, and overagainst it you have A which is the Dominical Letter sought.

Of the *Golden Number*, or Cycle of the Moon, with the Epact.

THE Golden Number is a Revolution of 19 Years, after which Time the Lunar and Solar Years are found to set out nearly together again. This Cycle was invented by *Meto*, an Athenian, and is often called the Metonic Cycle. The Epact is the Difference betwixt the Solar and Lunar Years; for as the Solar Year consists of 365 Days, and 12 Lunar Months, reckoning their mean Quantity at 29 Days and a Half, make only 354, there remains 11 Days, which makes the Moon, at the End of the Year, eleven Days more towards another Month than it was at the Beginning of the Year. This Surplus is call'd the Epact; when it amounts to above 30, they cast 30 off for a Month, and reckon the Remainder the Epact, as may be seen in Table II.

EXAMPLE VII.

The Golden Number given is 2, to find it's corresponding Epact.

Look in Table II. for 2, and even with it you have 22, which is the Epact for that Golden Number.

Of the *Roman Indiction.*

THE Roman Indiction is a System of 15 Julian Years, by which the Time of certain Payments were known to the Romans. As they recur in Order throughout the *Julian* Period, and have no other Mark than their proper Number, they need no further Explanation.

To find the *Cycle* of the SUN, and the *Dominical Letter.*

RULE.

DIVIDE the Year of the *Julian* Period by 28, (the Number of Years in the Solar Cycle) and the Remainder will be the Cycle of the Sun.—If nothing remains, the Cycle of the Sun is then 28, against which in the first Table you have the corresponding Dominical Letters.

EXAMPLE VIII.

What is the Cycle of the Sun and Dominical Letter, for the Year of Christ 1749.

Find what Year of the *Julian* Period it is by adding 4713.

Year of Christ	1749
Add	4713
Corresponding Year of the *Julian* Period	6462

Divide

Divide the Year of the Julian Period by 28.

28) 6462 (230
56
———
86
84
———
Cycle of the Sun 22

The Quotient ſhews you there has been 230 Revolutions of the Solar Cycle ſince the Commencement of the *Julian* Period, and the Remainder points out the Cycle of the Sun to be 22. Even with this in Table firſt, is the Dominical Letter A.

EXAMPLE IX.

What were the Cycle of the Sun and the Dominical Letters for the Year of the *Julian* Period 4713.

Divide by 28 28) 4713 (168
28
———
191
168
———
233
224
———
Cycle of the Sun 9

The Remainder is 9, which ſhews the Cycle of the Sun, and in the Firſt Table overagainſt this Cycle you will find the Dominical Letters to be D C.

This being the Year before Chriſt's Nativity, you may know any Years ſince by adding this Cycle 9 to the given Year of Chriſt; and dividing by 28, the Remainder is the Cycle of the Sun.

EXAMPLE X.

The Cycle of the Sun is requir'd for the Year of Chriſt 1749,

To the Year given, add the Cycle that was elaps'd at his Birth.

Year of our Lord	1749
Cycle elaps'd at his Birth	9
	28) 1758 (62
	168
	78
	56
Cycle of the Sun	22

Dividing by 28, the Remainder points out the Cycle of the Sun to be 22, overagainſt which in Table Firſt, is the Dominical Letter A, the ſame as Example VIII.

EXAMPLE XI.

The Cycle of the Sun and Dominical Letters are requir'd for the Year that *Julius Cæſar* reform'd the Calendar, being 45 Years before Chriſt.

Find the Year of the *Julian* Period.

Firſt Year of Chriſt was the Year of the *Julian* Period.	4714
From which take	45
Year of the *Julian* Period ſought	4669

Divide the Year of the *Julian* Period by 28.

	28)4669(166
	28
	186
	168
	189
	168
Cycle of the Sun	21

In

In Table 1ſt even with the Cycle of the Sun 21 are the Dominical Letters C B.

EXAMPLE XII.

The Cycle of the Sun and Dominical Letters are required for the Year that the Olympiads commenc'd, being 776 Years before Chriſt.

Find the Year of the *Julian* Period.

Firſt Year of Chriſt was the Year of the *Julian* Period.	4714
From which take	776
Correſponding Year of the *Julian* Period	3938

Divide the Year of the *Julian* Period by 28.

```
28)3938(140
   28
   ---
   113
   112
   ---
```

Cycle of the Sun 18

The Cycle of the Sun is 18, and the Dominical Letter by Table I. is F.

EXAMPLE XIII.

The Cycle of the Sun and Dominical Letters are requir'd for the firſt Year of Chriſt, being the Year of the *Julian* Period 4714.

Divide the Year of the *Julian* Period by 28.

```
28)4714(168
   28
   ---
   191
   168
   ---
    234
    224
   ---
```

Cycle of the Sun 10

The

The Cycle of the Sun is 10, and the Dominical Letter by Table First is B.

To find the GOLDEN NUMBER *and* EPACT.

RULE.

DIVIDE the given Year of the *Julian* Period by 19 (the Quantity of Years in the Golden Number) and the Remainder will be the Golden Number; if nothing remains the Golden Number is then 19, over-against which in Table II. you have the Epact.

EXAMPLE XIV.

The Golden Number and Epact is requir'd for the Year of our Lord 1749.

Find the Year of the *Julian* Period.

Year of Christ	1749
Years of the *Julian* Period elaps'd at Christ's Birth	4713
Year of the *Julian* Period sought	6462

Divide the Year of the *Julian* Period by 19.

```
19)6462(340
   57
   --
    76
    76
    --
Golden Number  2
```

The Remainder is 2, which is the Golden Number required; over-against this Golden Number in Table II. you have the Epact 22.

EXAMPLE

EXAMPLE XV.

The Golden Number and Epact are requir'd for the Year of the *Julian* Period 4713.

```
19)4713(248
   ----
   38
   ----
    91
    76
   ----
    153
    152
   ----
```

Golden Number 1

Dividing the Year of the JULIAN Period by 19, the Remainder is one, which is the Golden Number sought, and the Epact according to Table II. is 11.

The Golden Number being found to be 1, the Year before Christ, add 1 to any Years since, and divide the Sum by 19, the Remainder gives you the Golden Number.

EXAMPLE XVI.

The Golden Number is sought for the Year of our Lord 1937.

Add 1 and divide by 19.

```
Year of our Lord given   1937
Add                         1
                         ----
                    19)1938)102
                       ----
                       19
                       ----
                        38
                        38
                       ----
Golden Number 19.         0
```

The Remainder is nothing, the Golden Number must then be 19, and the Epact for that Year 29.

EXAMPLE

EXAMPLE XVII.

The Golden Number is requir'd for the Year before Chriſt 776.

Firſt Year of Chriſt	4714
Years before Chriſt ſubſtract	776
Year of the Julian Period	3938

Divide the Year of the JULIAN Period by 19.

```
19)3938(207
   38
   ---
    138
    133
    ---
```

Golden Number 5

EXAMPLE XVIII.

The Golden Number is requir'd for the firſt Year of our Lord

Year of our Lord	1
Years of the JULIAN Period elaps'd at Chriſt's Birth.	4713
	4714

Divide the Year of the JULIAN Period by 19.

```
19)4714(248
   38
   --
    91
    76
    --
    154
    152
    ---
```

Golden Number 2

To

To find the ROMAN INDICTION.

RULE.

DIVIDE the given Year of the *Julian* Period by 15, and the Remainder is the *Roman* Indiction; if nothing remains the *Roman* Indiction is then 15.

EXAMPLE XIX.

What is the *Roman* Indiction for the Year of our Lord 1749.

Add 4713 to bring it into the *Julian* Period.

Year of Christ.	1749
Add	4713
Year of the *Julian* Period	6462

Divide the Year of the *Julian* Period by 15.

15)6462(430
60
46
45

ROMAN Indiction 12

EXAMPLE XX.

The *Roman* Indiction is requir'd for the Year before Christ 45.

Find the Year of the *Julian* Period

First Year of Christ	4714
From which take	45
Year of the *Julian* Period	4669

Divide the Year of the *Julian* Period by 15.

```
15)4669(311
   45
   --
    16
    15
    --
     19
     15
     --
```

Roman Indiction 4

EXAMPLE XXI.

The *Roman* Indiction is sought for the Year of the *Julian* Period 4713.

```
15)4713(314
   45
   --
    21
    15
    --
     63
     60
     --
```

Roman Indiction 3

EXAMPLE XXII.

As the *Roman* Indiction by the last Example was found to be 3, the Year before Christ, it is requir'd for the Year of Christ 1749.

Year of our Lord given	1749
Roman Indiction elaps'd at his Birth	3
	1752

Divide

Divide this Addition by 15

```
15) 1752 (116
    15
    --
     25
     15
     --
     102
      90
     ---
Roman Indiction  12
```

This is further prov'd by Example XIX taken from the Beginning of the *Julian* Period,

EXAMPLE XXIII.

The *Roman* Indiction is requir'd for the Year of the *Julian* Period 4714.

Divide the given Year by 15.

```
15)4714(314
   45
   --
    21
    15
    --
     64
     60
     --
Roman Indiction  4
```

By the foregoing Examples the first Year of Christ being the 4714th Year of the *Julian* Period, had the following Characters.

Cycle of the Sun	10	Dominical Letter	B.
Golden Number	2	Roman Indiction	4.

It's pity but the Use of these Cycles with the *Julian* Period, had been known to former Historians, for if they had mark'd the Year with the 3 Cycles, it would have determin'd the Time past Dispute, for no 2 Years in the *Julian* Period can have the same 3 Cycles.

 The

The *Cycle* of the *Sun*, the *Golden Number*, and the *Roman Indiction* being known, to find the correſponding Year in the *Julian* Period.

RULE.

TAKE out that Sum from Table III. that is even with the Number of the Cycle of the Sun, as likewiſe that even with the Golden Number; add theſe together, and divide the Product by 15, the Remainder ſubſtract from the given Indiction (adding 15 to the given Indiction if the Subſtraction can't be done without) then take that Sum in the Table under the Title Indiction, that is even with the Number of this laſt Remainder, adding it to the 2 Sums took out before, and the Product gives you the Year of the *Julian* Period ſought. If ſuch Sum exceeds 7980, then 7980 is to be ſubſtracted from it, and the Remainder will be the Year of the *Julian* Period requir'd.

EXAMPLE XXIV.

The Cycle of the Sun given is 20. Golden Number 19. Roman Indiction 10. to find that Year in the *Julian* Period.

Even with the Cycle of the Sun Number 20 in the Table is	76
Even with the Golden Number 19 in the third Column is	532
Which makes	608

Divide

Divide this Sum by 15.

$$15)608(40$$
$$\underline{60}$$
$$8$$

The Remainder you'll find 8, which ſubſtracted from the *Roman* Indiction given, there remains 2.

Roman Indiction given	10
Remainder ſubſtract	8
	2
Even with this Number 2, in the Column Indiction you find	5852
To which add the 2 Sums took out before	608
Year of the *Julian* Period ſought	6460

The Year of the *Julian* Period requir'd, you find to be 6460, for no other Year in the *Julian* Period can have theſe 3 Cycles.

Proof,

28)6460(230	19)6460(340	15)6460(430
56	57	60
86	76	46
84	76	45
	0	
Cycle of the Sun } 20	Golden Number } 19	Roman Indiction } 10

EXAMPLE XXV.

What Year of Chriſt has the following Cycles. Cycle of the Sun 23. Golden Number 3. Roman Indiction 13.

Even with the Cycle of the Sun 23, is	247
Even with the Golden Number 3 is	364
	611

 Divide

Divide this by 15.

15)611(40

60

Remainder 11

Subſtract the Remainder from the given Indiction	13
Remainder	11
Laſt Remainder	2
Even with this laſt Remainder 2 in the Column Indiction is	5852
2 Sums took out before	611
Year of the *Julian* Period	6463
Year of the *Julian* Period found	6463
Years elaps'd at Chriſt's Birth ſubſtract	4713
Year of our Lord requir'd	1750

The next Example has all the Variety the Rule can have.

EXAMPLE XXVI.

The Year of the *Julian* Period is requir'd for the Cycle of the Sun 16. Golden Numbor 16. Roman Indiction 1

Even with the Cycle of the Sun 16 is	380
Even with the Golden Number 16 is	168
	548

Divide this Sum by 15.

15)548(36

45

98

90

Remainder 8

As

As this Remainder is more than the *Roman* Indiction given, a whole Cycle must be added to the given Indiction, to make the Substraction possible.

Given Indiction	1
A whole Cycle	15
	16
Remainder substract	8
Last Remainder	8
Even with the last Remainder 8 is	7448
The 2 Sums took out before	548
	7996

This being more than the *Julian* Period, substract the *Julian* Period from it.

Sum found	7996
Julian Period substract	7980
Year of the *Julian* Period sought	16

Of the CALENDAR.

THE Calendar is a complete *Julian* Year with it's Divisions of Months, Weeks, Days, remarkable Times, public Feasts, &c. The Calendar took it's Name from the Romans calling the first Day of the Month the Kalends of that Month. I have chose *Smart*'s Calendar, as it's fitted for any Year in the *Julian* Period. The Months, with their Number of Days, are set down in their proper Order; in each Month are 9 Columns, 7 of which have a Dominical Letter at the Top, and the Days of the Week, down the Columns answering to those Dominical Letters; in the 8th Column are the Days of the Month; in the last Column are the remarkable Days, fixed Feasts, with the Time of Sun's rising for this present Age, &c.

The

The Uſe of the CALENDAR.

THE great Uſe of this Calendar is, that we can apply to it all chronological Characters, at all Times; for by finding the Dominical Letter for any Year, and following thoſe Columns in the Calendar that hath the ſame Dominical Letter at the Top, you will have the Day of Month and Day of the Week throughout that Year.

EXAMPLE XXVII.

What Day of the Week was the firſt of *January* in the Year of Chriſt 300.

Find the Year of the *Julian* Period.

Year of our Lord given	300
Years of the *Julian* Period elaps'd at Chriſt's Birth add,	4713
Year of the *Julian* Period	5013

Find the Cycle of the Sun by dividing the Year of the *Julian* Period by 28.

28)5013(179
28
221
196
253
252

Cycle of the Sun 1

The Cycle of the Sun is 1, and the Dominical Letters according to Table I. are G. F.

The firſt of theſe Dominical Letters ſerves for *January* and *February*, the other for the reſt of the Year.

Enter

Enter the Calendar, and in the Month of *January* in the Column G you'll find m for Monday to be even with the first; the first of *February* in the Column G, you'll find th for Thursday.

Enter *March* with F, and even with the First you'll find fr for Friday. Even with the first of *April* you'll find m for Monday. Even with the first of *May* in the Column F, you'll find w for Wednesday, *&c.*

EXAMPLE XXVIII.

What Day of the Week was the 10th of JULY, in the Year of the JULIAN Period 4750.

Find the Cycle of the Sun by dividing by 28.

```
28)4750(169
   28
   ---
   195
   168
   ---
    270
    252
    ---
Cycle of the Sun  18
```

Over-against the Cycle of the Sun 18 in the first Table, is the Dominical Letter F.

Look in the Calendar for the Month JULY, and even with the 10th in the Column F, you'll find w for Wednesday, the Day requir'd.

EXAMPLE XXIX.

What Day of the Month was the first Sunday after the 10th of *April* in the Year of our Lord 1666.

Find the Year of the JULIAN Period.

Year of Christ given	1666
Years of the JULIAN Period elaps'd at Christ's Birth	4713
Year of the JULIAN Period requir'd	6379

Find

Find the Cycle of the Sun by dividing by 28.

28)6379(227

56

77
56

219
196

Cycle of the Sun 23

The Solar Cycle is 23 and the correſponding Dominical Letter by Table 1ſt is G.

Look in the Calendar for the Month of April, and in the Column G you'll find tu for Tueſday, to be even with the 10th, the Sunday following was the 15th.

EXAMPLE XXX.

What Day of the Week will Chriſtmas Day happen on in the Year of our Lord 2200.

Find the Year of the *Julian* Period.

Year of our Lord given	2200
Years of the *Julian* Period elaps'd at Chriſt's Birth	4713
Year of the *Julian* Period	6913

Find the Solar Cycle.

28)6913(246

56

131
112

193
168

Cycle of the Sun 25

The

The Solar Cycle being 25, the Dominical Letters by Table the 1ſt are E, D.

Enter the Month *December* in the Calendar with D, and you'll find fr. for Friday to be even with the 25th, which will be Chriſtmas Day that Year.

EXAMPLE XXXI.

What Day of the Month was the firſt Sunday in March, in the Year of the *Julian* Period 4712.

Find the Cycle of the Sun.

28)4712(168
28
191
168
232
224

Solar Cycle 8

In Table 1ſt over-againſt 8, is the Dominical Letter E, entering *March* in the Calendar in the Column E, you'll find the firſt S for Sunday to be even with the ſecond Day of the Month.

To find EASTER, *according to the Table that our Church follows.*

RULE.

FIND the Golden Number, as likewiſe the Dominical Letter ; then look in Table 4th for the Dominical Letter, and in that Column, even with the Golden Number, you have the Time of Eaſter Day ſought.

Note : When there are two Dominical Letters the lat-or is us'd.

EXAMPLE

EXAMPLE XXXII.

What Time did Eaſter happen in the Year of Chriſt 326, being the Year after the Council of *Nice* had ſettled it.

Find the Year of the Julian Period.

Year of Chriſt given	326
Years of the *Julian* Period elaps'd at Chriſt's Birth	4713
Year of the JULIAN Period	5039

Find the Cycle of the Sun by dividing the Year of the *Julian* Period by 28.

```
28)5039)179
   28
   ---
   223
   196
   ---
    279
    252
    ---
```

Solar Cycle 27

In Table 1ſt over-againſt the Cycle of the Sun 27 is the Dominical Letter B.

Then find the Golden Number by dividing the Year of the JULIAN Period by 19.

```
19)5039)265
   38
   ---
   123
   114
   ---
    99
    95
    ---
```

Golden Number 4

Look

Look in Table 4th for the Dominical Letter B, and in that Column even with the Golden Number 4 you have *April* the 3d for Eaſter Sunday that Year.

EXAMPLE XXXIII.

Eaſter Sunday is required for the Year of our Lord 1749.

Find the Year of the JULIAN Period.

Year of Chriſt given	1749
Years add	4713
Year of the JULIAN Period	6462

Find the Cycle of the Sun by dividing the *Julian* Period by 28.

28)6462(230
56
86
84
Cycle of the Sun 22

In Table 1ſt. even with the Cycle of the Sun 22, is the Dominical Letter A.

Find the Golden Number by dividing the Year of the *Julian* Period by 19.

19)6462(340
57
76
76
Golden Number 2

In Table IV. in the Column A, even with the Golden Number 2, is *March* the 26th for *Eaſter* Sunday.

To find the MOVEABLE FEASTS.

RULE.

FIND the Time of *Easter*, and in the Table of Moveable Feasts; at the End of the Calendar you have the Time of all the Feasts which depend upon it.

EXAMPLE XXXIV.

What Time did Shrovetide happen in the Year of Christ 1311.

Find the *Julian* Period.

Year of Christ given	1311
Years of the *Julian* Period add	4713
Corresponding Year of the *Julian* Period	6024

Find the Cycle of the Sun, by dividing the Year of the *Julian* Period by 28.

28)6024(215
56
42
28
144
140

Solar Cycle 4

The Solar Cycle being 4, the Dominical Letter by Table Ist. is C.

Find

Find the Golden Number by dividing the Year of the *Julian* Period by 19.

```
19) 6024 (317
    ----
    57
    ----
     32
     19
    ----
    134
    133
    ----
```

Golden Number 1

Enter Table 4th with the Dominical Letter C, and in that Column, even with the Golden Number 1, you have *April* 11th. for *Easter* Sunday.

In the Table of Moveable Feasts, even with *Easter* Day of *April* 11th. you find Ash Wednesday, which is Shrove Week, to fall on *February* 24th.

EXAMPLE XXXV.

What Time will *Whitsunday* happen, in the Year of our Lord 2142.

Find the Year of the *Julian* Period.

Year of Christ given	2142
Years elaps'd add	4713
Year of the *Julian* Period sought	6855

Find the Cycle of the Sun, by dividing the Year of the *Julian* Period by 28.

```
28)6855(244
   ----
   56
   ----
   125
   112
   ----
    135
    112
   ----
```

Solar Cycle 23 C 3 The

The Cycle of the Sun being 23, the correſponding Dominical Letter, by Table 1ſt. is G.

Find the Golden Number, by dividing the Year of the *Julian* Period by 19.

19)6855(360

57

115
114

Golden Number 15

Enter Table the 4th, and in the Column G, even with the Golden Number 15, you have *April* 8th. for *Eaſter* Sunday.

In the Table of Moveable Feaſts, even with *April* 8th. you find *Whitſunday, May* 27th, the Time ſought.

EXAMPLE XXXVI.

What Time was Aſh Wedneſday, in the Year of Chriſt 400.

Find the Year of the *Julian* Period.

Years of our Lord given	400
Years elaps'd add	4713
Year of the *Julian* Period ſought	5113

Find the Cycle of the Sun, by dividing the Year of the *Julian* Period by 28.

28)5113(182

28

231
224

73
56

Solar Cycle 17

The

The Cycle of the Sun being 17, the correſponding Dominical Letters, by Table 1ſt. are A, G.

Find the Golden Number, by dividing the Year of the *Julian* Period by 19.

19)5113)269

38

131
114

173
171

Golden Number 2

To find *Eaſter*, enter Table 4th. with the latter of the Dominical Letters G, and even with the Golden Number 2, you have *April* 1ſt. for *Eaſter* Sunday.

In the Table of Moveable Feaſts, even with *Eaſter* Sunday of *April* the 1ſt. you have *February* 14th for Aſh-Wedneſday: But as this was Leap Year, and the Feaſt ſought happening in *February*, by a Note in the Table it muſt be one Day later, that is, on *February* the 15th.

To find LEAP YEAR.

RULE.

TAKE one from the given Year of the *Julian* Period, and divide the Reſt by 4; if nothing remains it is then Leap Year; if one, 'tis the firſt; if two, the ſecond; if three, the third after.

The Reaſon of ſubſtracting one from the given Year, is becauſe the firſt Year of the *Julian* Period was ſuppos'd a Leap Year, (and not the firſt after) ſo the ſecond Leap Year, was the 5th Year of the *Julian* Period; the third Leap Year the 9th; the fourth Leap Year the 13th Year of the *Julian* Period, &c.

EXAMPLE XXXVII.

What Year of Biſſextile, is the Year of the *Julian* Period 6462.

Subſtract one ftom the given Time, and divide by 4.

Year given	6462
One ſubſtract	1
Divide by 4	4)6461(1ſt after
	1615

If for any Year of Chriſt, you would know when Leap Year happens, it's only dividing by 4, (for the 1ſt Year of Chriſt, was the firſt after Leap Year) and the Remainder ſhews you, whether Leap Year, firſt, ſecond, or third after.

EXAMPLE XXXVIII.

What Year of Biſſextile, is the Year of Chriſt 1749.

Divide by 4	4)1749(1ſt after
	437

The ſame as the above Example, taken from the Beginning of the *Julian* Period.

To make the Diviſion ſhort, you may caſt away the Thouſands and Hundreds, and dividing the Reſt by 4, the Remainder gives you the Year of Biſſextile ſought.

Of the *Anticipation*, or *going back* of the EQUINOXES.

THE *Julian* Year, conſiſting of 365 Days, 6 Hours, and the Solar Tropical Year of only 365 Days, 5 Hours, 48 Minutes, 57 Seconds; which is 11 Minutes, 3 Seconds, ſhort of the *Julian* Year: The Sun muſt enter Aries, or the Vernal Equinox, 11 Minutes, 3 Seconds

nearer

nearer *January* every Year than other; and as the 6 Hours in the *Julian* Account are not reckoned every Year, but reserv'd to make up a Day in Leap Year, there arises great Differences in the Times of the Equinoxes, one Year from another.

For Instance; suppose the Sun to enter Aries any Year on *March* 10th, at 6 in the Morning, that Year being Leap Year. To the next *March* 10th, at 6 in the Morning, are only 365 Days; and the Solar Year being 5 Hours, 48 Minutes, 57 Seconds more, the Sun must enter Aries that Year on *March* the 10th, 11 Hours, 48 Minutes, 57 Seconds; To the next *March* the 10th, 11 Hours, 48 Minutes, 57 Seconds, are only 365 Days; that being likewise 5 Hours, 48 Minutes, 57 Seconds short of the Solar Year, the Sun must enter Aries on *March* 10th, 17 Hours, 37 Minutes, 54 Seconds.

To the next *March* the 10th, 17 Hours, 37 Minutes, 54 Seconds, are only 365 Days; so that 5 Hours, 48 Minutes, 57 Seconds more must be added, to give the Time of the Sun's Entrance into Aries, which makes *March* 10th, 23 Hours, 26 Minutes, 51 Seconds.

To the next *March* 10th, 23 Hours, 26 Minutes, 51 Seconds, as a Day will be added in *February* for Leap Year, will be 366 Days, which is 18 Hours, 11 Minutes, 3 Seconds more than a Solar Year; that taken from *March* 10th, 23 Hours, 26 Minutes, 51 Seconds, gives *March* 10th, 5 Hours, 15 Minutes, 48 Seconds, the same Time that it enter'd Aries the Leap Year before, excepting 44 Minutes, 12 Seconds, for 4 Years Anticipation.

By this it appears, that the Equinoxes move forward almost 6 Hours every common Year in our Account, then are thrown back above 18 Hours in Leap Year, which makes them recede on the whole, 11 Minutes, 3 Seconds, per Annum.

To find the Time of the SUN's *Entrance into* Aries, *or the* Vernal Equinox.

RULE.

TAKE out of Table V. the Anticipation for as many Years as are elaps'd, from the Beginning of the *Julian* Period, to the Beginning of the Year you are in. Subſtract that Sum from the Radix, anſwering to the current Year, whether Leap Year, Firſt, Second, or Third after, and the Remainder will give you the Number of Days to be reckoned from Midnight, the firſt of *January*. From this Sum taking off 59 Days for a common, or 60 for a Leap Year, (being the Number of Days from the Beginning of the Year to *March*) and the Remainder will give you the Day and Hour in *March* that the Sun enters the Vernal Equinox.

EXAMPLE XXXIX.

What Time did the Sun enter the Vernal Equinox, the firſt Year of the Reformation of the Calendar, by *Julius Cæſar*, being 45 Years before Chriſt.

Find what Year of the *Julian* Period that was coincident with.

Firſt Year of Chriſt was the Year of the *Julian* Period.	4714
From which ſubſtract	45
Year of the *Julian* Period ſought	4669

Proceed to find what Year of Biſſextile it was, which according to the foregoing Rule, you muſt do by taking 1 from the Year of the *Julian* Period, and dividing the reſt by 4.

Year

Year of the *Julian* Period	4669
Subſtract	1
Divide by	4 | 4668 | 0
	1167

As nothing remains it ſhews you it was Leap Year. Then take out the Anticipation from Table V.

	Anticipation Days.	Hours.	Min.	Sec.
For 4000	30	16	40	0
600	4	14	30	0
60	—	11	3	0
8	—	1	28	24
4668 Years	35	19	41	24

Thus you have the Anticipation for 4668 Years, being the Number of Years from the Beginning of the *Julian* Period, to the Beginning of the Year ſought.

Which Sum ſubſtract from the Radix in Table V. for Leap Year, (as the current Year was found to be Leap Year.)

	Days.	Hours.	Min.	Sec.
Radix for Leap Year.	118	19	9	13
Anticipation ſubſtract	35	19	41	24
	82	23	27	49

It gives you the Number of Days from the firſt of *January* at Midnight.

From this Sum taking off 60 Days (the Number of Days in a Leap Year to the firſt of *March*) and you have the Day and Hour in *March* requir'd.

	Days.	Hours.	Min.	Sec.
Sum found	82	23	27	49
Number ſubſtract	60			
Time of the Sun's Entrance into the Vernal Equinox	22	23	27	49

That is on March the 22d, 27 Minutes, 49 Seconds paſt Eleven at Night.

EXAMPLE

EXAMPLE XL.

What Time did the Sun enter Aries the First Year of Christ. Proceed after the foregoing Manner, first find the Year of the *Julian* Period.

Year of Christ	1
Years add	4713
Year of the *Julian* Period	4714

To find the Year of Bissextile substract 1 from the Year of the *Julian* Period, and divide the rest by 4, the Remainder will give you the Year of Bissextile sought.

Year of the *Julian* Period	4714
Substract	1
	4 | 4713 | 1st
	1178

The Remainder is 1, which shews you it was the First after.

Then take out the Anticipation.

Years	Days.	Hours.	Min.	Sec.
For 4000	30	16	40	0
700	5	8	55	0
10		1	50	30
3			33	9
4713	36	3	58	39

The Anticipation for 4713 Years, is 36 Days, 3 Hours, 58 Minutes, 39 Seconds, which substracted from the Radix for the First after Leap Year.

	Days.	Hours.	Min.	Sec.
Radix 1st after L. Year	118	1	9	13
Anticipation substract	36	3	58	39
Sun's Entrance into Aries	81	21	10	34

Makes the Sun to enter Aries the 81st Day, 21 Hours, 10 Minutes, 34 Seconds, from the First of *January*.

Take

Take off 59, the Number of Days in a common Year to the 1ſt of March.

	Days.	Hours.	Min.	Sec.
	81	21	10	34
Days ſubſtract	59			
Sun enters Aries March	22d	21	10	34

The Time ſought is March 22d, 10 Minutes, 34 Seconds after 9 at Night.

EXAMPLE XLI.

What Time did the Sun enter Aries in the Year of the *Julian* Period 6460

Find the Year of Biſſextile by ſubſtracting 1, and dividing by 4.

6460
1
4)6459(3d after
1614

Take out the Anticipation

	Days.	Hours.	Min.	Sec.
6000	46	1	0	0
400	3	1	40	0
50	0	9	12	30
9	0	1	39	27
6459	49	13	31	57

Subſtract the Anticipation from the Radix for the 3d after Leap Year.

Radix	118	13	9	13
Anticipation	49	13	31	57
	68	23	37	16

Take off 59 Days, and you have the Time in *March* the Vernal Equinox happened.

	Days.	Hours.	Min.	Sec.
	68	23	37	16
Days ſubſtract	59			
Sun enters Aries *March*	9	23	37	16

That is, on *March* the 9th, 37 Minutes, 16 Seconds, paſt 11 at Night.

EXAMPLE XLII.

What Time did the Sun enter the Vernal Equinox, in the Year of our Lord 1748.

Find the Year of the *Julian* Period.

Year of our Lord given	1748
Years add	4713
Year of the *Julian* Period ſought	6461

Find the Year of Biſſextile.

6461
1

4)6460(0 Leap Year

1615

Take out the Anticipation.

Years	Days.	Hours.	Min.	Sec.
6000	46	1	—	—
400	3	1	40	—
60	—	11	3	—
6460	49	13	43	—

Subſtract

Substract the Anticipation from the Radix for Leap Year.

	Days.	Hours.	Min.	Sec.
Radix	118	19	9	13
Anticipation	49	13	43	0
	69	5	26	13

Take off 60 Days, as it's Leap Year, and you have the Day in *March* the Sun enter'd Aries.

Days.	Hours.	Min.	Sec.
69	5	26	13
60			
9	5	26	13

That is *March* the 9th, 26 Minutes, 13 Seconds, after 5 in the Morning.

EXAMPLE XLIII.

The Time of the Sun's Entrance into the Vernal Equinox is requir'd for the Year of our Lord 1749.

Find the correſponding Year in the JULIAN Period.

Year of our Lord given	1749
Years add	4713
Year of the JULIAN Period	6462

Find the Year of *Biſſextile*

6462
1

4)6461(1ſt after

1615

Take out the Anticipation.

Years.	Days.	Hours.	Min.	Sec.
6000	46	1	—	—
400	3	1	40	—
60	—	11	3	—
1	—	—	11	3
6461	49	13	54	3

Subſtract the Anticipation from the Radix, for the 1ſt after Leap Year.

	Days.	Hours.	Min.	Sec.
Radix	118	1	9	13
Anticipation	49	13	54	3
	68	11	15	10

Take off 59 Days as it's a common Year, and you have the Time in March the Sun enters the Vernal Equinox.

	Days.	Hours.	Min.	Sec.
	68	11	15	10
	59			
Sun in Aries *March*	9	11	15	10

That is on *March* the 9th, 15 Minutes, 10 Seconds after 11 in the Morning.

I have likewiſe added in Table V. a Radix for the Years ſince Chriſt reckon'd from Midnight.

You need only find the Year of *Biſſextile*, and take out the Anticipation for as many Years as are elaps'd ſince Chriſt, ſubſtracting that Sum from the Radix for the current Year, and you have the Time in *March* the Equinox happens.

EXAMPLE

EXAMPLE XLIV.

I want to know when the Sun enter'd Aries the Year of the Passion; being in the Year of Christ 33.

Find the Year of Bissextile by dividing the given Year of Christ by 4.

4)33(1st after Leap Year.

8

Take out the Anticipation for as many Years as were elaps'd since Christ's Birth.

Years	Days.	Hours.	Min.	Sec.
30	0	5	31	30
2	0	0	22	6
32	0	5	53	36

Subtract the Anticipation from the Radix for the first after Leap Year, and you will have the Time requir'd, reckon'd from Midnight.

		Days.	Hours.	Min.	Sec.
Radix	March	22	21	10	34
Anticipation subtract		—	5	53	36
Sun in Aries		22	15	16	58

That is on *March* 22d, 16 Minutes, 58 Seconds after 3 in the Afternoon.

EXAMPLE XLV.

What Time did the Sun enter Aries the Year that the *Nicene* Council met; being in the Year of Christ 325.

Find the Year of Bissextile.

4)325(1st after Leap Year.

81

Take

Take out the Anticipation.

	Days.	Hours.	Min.	Sec.
300	2	7	15	0
20		3	41	0
4			44	12
324	2	11	40	12

Subſtract the Anticipation from the Radix, for the firſt after Leap Year.

	Days.	Hours.	Min.	Sec.
Radix	22	21	10	34
Anticipation ſubſtract	2	11	40	12
Sun in Aries *March*	20	9	30	22

It gives *March* the 20th, 30 Minutes, 22 Seconds, after 9 in the Morning.

EXAMPLE XLVI.

What Time was the Vernal Equinox, in the Year of our Lord 1747.

Find the Year of Biſſextile.

4)1747(3d after Leap Year.

436

Take out the Anticipation.

	Days.	Hours.	Min.	Sec.
1000	7	16	10	0
700	5	8	55	0
40		7	22	0
6		1	6	18
1746	13	9	33	18

Subſtract

Subſtract the Anticipation from the Radix for the 3d after Leap Year

	Days.	Hours.	Min.	Sec.
Radix 3d after L. Year	23	9	10	34
Anticipation ſubſtract	13	9	33	18
Sun in Aries *March*	9	23	37	16

The Vernal Equinox happen'd in the Year of Chriſt 1747, on *March* 9th, 37 Minutes, 16 Seconds paſt 11 at Night The ſame as Example 41, taken from the Beginning of the *Julian* Period.

EXAMPLE XLVII.

What Time did the Vernal Equinox happen, in the Year of our Lord 1748,

Find the Year of the Biſſextile.

4)1748(Leap Year

437

Take out the Anticipation.

Years	Days.	Hours.	Min.	Sec.
1000	7	16	10	0
700	5	8	55	0
40	0	7	22	0
7	0	1	17	21
1747	13	9	44	21

Subſtract the Anticipation from the Radix for Leap Year.

	Days.	Hours.	Min.	Sec.
Radix for Leap Year.	22	15	10	34
Anticipation ſubſtract	13	9	44	21
Sun's Entrance into Aries	9	5	26	13

The Sun enter'd the Vernal Equinox, in the Year of our Lord 1748, on *March* 9th, 26 Minutes, 13 Seconds after 5 in the Morning.

This is further prov'd by Example 42, taken from the Beginning of the *Julian* Period.

EXAMPLE XLVIII.

What Time does the Sun enter Aries, in the Year of our Lord 1749.

Find the Year of Biſſextile.

4)1749(1ſt after Leap Year.

437

Take out the Anticipation.

	Days.	Hours.	Min.	Sec.
1000	7	16	10	0
700	5	8	55	0
40	0	7	22	0
8	0	1	28	24
1748	13	9	55	24

Subſtract the Anticipation from the Radix, for the firſt after Leap Year.

	Days.	Hours.	Min.	Sec.
Radix	22	21	10	34
Anticipation Subſtract	13	9	55	24
Sun in Aries *March*	9	11	15	10

The Sun enters Aries this Year *March* 9th, 15 Minutes, 10 Seconds, after eleven in the Morning; agreeble to Example 43, taken from the Beginning of the *Julian* Period.

EXAMPLE XLIX.

What Time will the Vernal Equinox happen in the Year of our Lord 1890.

4)1890(2d after Leap Year

472

Years,

Years.	Anticipations. Days.	Hours.	Min.	Sec.
1000	7	16	10	0
800	6	3	20	
80		14	44	
9		1	39	27
1889	14	11	53	27

	Days.	Hours.	Min.	Sec.
Radix for 2d after LeapYear	23	3	10	34
Anticipation ſubſtract	14	11	53	27
	8	15	17	7

Sun will enter the Vernal Equinox on *March* the 8th, 17 Minutes, 7 Seconds paſt three in the Afternoon.

Of the GREGORIAN Account, or NEW STILE.

POPE GREGORY the 13th, finding the *Julian* Account erroneous, by reaſon of the foregoing Anticipation, reſolv'd upon an Alteration of it, which he finiſh'd in the Year of Chriſt 1582, and which from him was call'd the *Gregorian* Account, or *New Stile*. The *Pope* in this Reformation look'd no further back than the Council of *Nice*, which was held in the Year of Chriſt 325, and finding ſince that Time the Vernal Equinox had receded 10 Days, he order'd 10 Days of that Year (1582) to be omitted, which was done by calling the 5th of *October* the 15th.

And to prevent Errors of the like Nature for the future, he order'd the ſubſtracting 3 Days from every Revolution of 400 Years, to be done by omitting the 29th of *February*, at the End of 3 Centuries, viz. in the Years of our Lord 1700, 1800, and 1900, and at the End of

the 4th Century, that is in the Year of our Lord 2000, to retain it. This is therefore the Reaſon that before the 29th of *February* 1700, the Difference between the New and Old Stile was only 10, whereas ſince that Time it has been 11 Days; and after the Year of our Lord 1800 will be 12 Days before us, if we don't come into their Way of reckoning.

There was ſome talk of our Legiſlature altering our Account of Time, which if they do, in my humble Opinion, it would be the beſt to follow the Method of Pope *Gregory*, by omitting (now) 11 Days, all at once, and ſo continue the Account with the *Gregorians*; for if they alter it any other way, they will quit by much the beſt Syſtem (the *Julian*) and not gain the Point propos'd by ſuch an Alteration, which is to agree with our Neighbours in our Dates, and obſervance of publick Times. The *Julian* Account is abundantly the beſt to reckon Time by, being an interrupted Series of 4 Years, made equal to each other, by the Addition of a Day every 4th Year; it is true, they are more than the Tropical Years by 11 Minutes, 3 Seconds per Annum, but this is ſufficiently noted, that no great Inconvenience can ariſe from it. By the *Gregorian* Account, the Year is brought nearer the Tropical Return of the Sun, at the End of each Century, by omitting that Day in Leap Year, which the *Julian* Account retains, but then it takes 400 Years in making them equal to each other, or giving their mean Quantity, which is done in 4 Years by the *Julian*.

The *Gregorian* Account takes in no Æra of Conſequence, whereas the *Julian* was fix'd a little before that grand Epocha, the Birth of Chriſt.

The *Gregorian* Account agrees with the *Julian* in the Days of the Week, being always in the ſame Day of the Week together.

They both uſe the ſame Calendar; ſo far as having the ſame Number of Months and ſame Number of Days in each Month, &c. Agree with each other in Biſſextile, for 99 Years, then the *Gregorian* has a Common, inſtead of a Leap One; after that they agree for 99 Years longer, &c They differ, in that they very ſeldom will begin the Year on the ſame of the Week.

They

They differ in the Day of the Month; and very often are not in the ſame Month together.

They differ in the Times of obſerving publick Feaſts, &c.

To find the GREGORIAN Dominical Letters.

THE caſting off ten Days in 1582, as likewiſe omitting the Day for Leap Year in 1700, breaking the Order of the Dominical Letters, making it impoſſible for the Cycle of the Sun in the *Julian* Table, Number I. to point out the Dominical Letters for the Gregorian Years, oblig'd me to form Tables for adjuſting the Cycle of the Sun to the proper Dominical Letters, for the Years in the *Gregorian* Account.

R U L E.

Find the Solar Cycle for the given Year, and even with it in the Tables VI. VII. VIII. IX. X. or XI. you have the Dominical Letters ſought.

If the Dominical Letter requir'd, be between the Years of our Lord 1582 and 1699, incluſive, look in Table VI.

If between the Years of our Lord 1701 and 1799, incluſive, look in Table VII.

If between 1801 and 1899, incluſive, look in Table VIII.

If between 1901 and 2099, incluſive, look in Table IX.

If between 2101 and 2199, incluſive, the ſame Letters as the *Julian* uſes, will anſwer for this Century, (or Table X.) being 14 Days before that Account, which is even Weeks.

If the Year ſought, be between the Years of our Lord 2201 and 2299, incluſive, look in Table XI.

EXAMPLE

EXAMPLE L.

What was the Gregorian Dominical Letter, for the Year of Chrift 1670.

Find the Solar Cycle, which according to the forego-ing Examples, you muft do by bringing the Year into the *Julian* Period, and dividing by 28, the Remainder will be the Cycle of the Sun.

Year of our Lord given	1670
Years elaps'd, add	4713
Year of the *Julian* Period	6383

28)6383(227
56
78
56
223
196

Cycle of the Sun 27

As the Year requir'd, is between 1582, and 1699, look in Table VI. and even with the Solar Cycle 27, is the Dominical Letter E. Enter the Calendar with the Letter E, and you have an Almanack for that Year, New Stile.

EXAMPLE LI.

The Gregorian Dominical Letter is requir'd for the Year of the *Julian* Period 6462.

Find the Solar Cycle.

28)6462(23
56
86
84

Cycle of the Sun 22

Find

Find what Year of our Lord, the given Time is answerable to.

Year of the *Julian* Period	6462
Years substract	4713
Year of our Lord	1749

As this is between the Years of our Lord 1701 and 1799, look in Table VII. and you'll find the Dominical Letter over against the Cycle of the Sun 22, to be E.

EXAMPLE LII.

What will be the Gregorian Dominical Letters for the Year of Christ 1820.

Find the Solar Cycle.

```
     1820
     4713
     ----
 28)6533(233
     ----
     56
     ----
      93
      84
     ----
       93
       84
     ----
Cycle of the Sun    9
```

Enter Table VIII. as the Year given is between 1801 and 1899, and you'll find the Dominical Letters even with the Cycle of the Sun 9, to be B, A.

EXAMPLE LIII.

What was the *Gregorian* Dominical Letter for the Year of our Lord 1700.

This Year instead of being Bissextile was reckon'd a common one, according to the *Gregorian* Rule, so is one of those that break the Order of the Domincal Letters, and is plac'd by itself at the Top of the Table, as are likewise

likewiſe the Dominical Letters for 1800, 1900, 2100, and 2200.

EXAMPLE LIV.

What will be the *Gregorian* Dominical Letters for the Year of the *Julian* Period 6713.

Find the Solar Cycle.

```
28)6713(239
   ---
   56
   ---
   111
    84
   ----
    273
    252
   ----
Cycle of the Sun        21
```

Find what Year of Chriſt it is to apply it to it's proper Table.

Year of the *Julian* Period	6713
Years ſubſtract	4713
Year of our Lord	2000

Enter Table IX. as this Year is between 1901 and 2099. Look for the Solar Cycle 21, and overagainſt it you have B A. which are the Dominical Letters ſought,

This is the Year that retains the 29th of *February*, according to the *Gregorian* Order.

EXAMPLE LV.

The *Gregorian* Dominical Letters are ſought for the Year of Chriſt 2140.

Find

Find the Solar Cycle.

```
        2140
        4713
     28)6853(244
        ---
        56
        ----
         125
         112
        -----
          133
          112
        -----
Cycle of the Sun   21
```

Overagainst this Cycle of the Sun in Table X. you have the Dominical Letters C B.

The same as the *Julian* Dominical Letters for that Year.

The *Gregorian* Dominical Letter is requir'd for the Year of the *Julian* Period 7000.

Find the Cycle of the Sun.

```
     28)7000(25
        56
        ---
         140
         140
         ---
```

As nothing remains the Solar Cycle is 28 : Find what Year of Christ it is coincident with.

Year of the *Julian* Period	7000
Years substract	4713
Year of our Lord	2287

Look in Table XI. and even with the Cycle of the Sun 28. is B the Dominical Letter sought.

Of the Defect *in the* EPACT.

WHAT was said of the Epact before must be regarded for the general Use of it only; not that it corresponds exactly with the Motion of the Moon in 19 Years, for Observation hath found great Differences to arise from it in the settling of *Easter*, which may be accounted for as follows.

When the Council of *Nice* met to fix *Easter*, and thereby quell those Heats that had arisen betwixt the Eastern and Western Churches, the *Metonic* Cycle was had in great Esteem, for they set down the Time of New Moon in the first Year of this Cycle, for *January*, *February*, *March*, *&c.* and mark'd the Days which they fell on, in the Calendar with Number 1.

The next Year, the Days that the New Moons fell on in the several Months, they mark'd in the Calendar with Number 2. and so on for 19 Years, which Marks were call'd the Golden Numbers; then they concluded the New Moons wou'd come round exactly again, as they were mark'd in the Calendar, and thereupon made an Order that *Easter* should be the first Sunday after the first Full Moon that shou'd happen next after the 21st of *March*, thinking the Vernal Equinox always to continue on the 21st of *March*, as likewise, that the Golden Numbers in the Calendar, wou'd always mark out the New Moon. Upon this Supposition, the Table Number 4 was form'd for finding of *Easter* for ever; but the *Nicene* Council were mistook in Point of the Equinox 11 Minutes 3 Seconds per Annum, as shewn before; which has caus'd, since that Time, a Difference of 11 Days; and that the New Moons don't come round exactly again in 19 Years, may be prov'd thus,

From Table XIII, in 19 *Julian* mean Years are contain'd 6939 Days, 18 Hours; and by Table XV you will find that in 19 *Julian* Years are 235 Lunations, which contain, according to Table XIV, 6939 Days, 16 Hours, 32 Minutes. This shews they come round in 1 Hour, 28 Minutes,

nutes leſs than 19 Years, and of Courſe the New Moons have receded back, at the Rate of 1 Hour, 28 Minutes for every 19 Years ſince the *Nicene* Council; this Difference hath thrown the Golden Numbers in the Calendar, which we will call the Eccleſiaſtical New Moons, four Days and a half later than the Aſtronomical or real New Moons; for which Reaſon, when the Full Moon happens within 4 Days of the 21ſt of *March*, the *Nicene* Rule contradicts the Table Number 4, which our Church uſes for finding of *Eaſter*; for ſuppoſing the Aſtronomical or real Full Moon to fall on *March* the 19th, the Eccleſiaſtical Full Moon that Year, wou'd be ſuppos'd *March* the 23d; in ſuch Caſe, by the Table, *Eaſter* Day wou'd be the Sunday after, ſo wou'd be the Sunday following the Full Moon of *March* the 19th, and not according to the Rule of *March* the 21ſt; however, it wou'd be the Time our Church wou'd celebrate *Eaſter*, for we follow Table IV. and not the *Nicene* Rule.

The Note in the Rule for finding of *Eaſter* in our Common Prayer Books, *viz.* If the Full Moon happens of a Sunday, *Eaſter* Day to be the Sunday following ſhall be prov'd an Error, crept in ſince the *Nicene* Council; but of this hereafter.

To find the MOON's Age *at any Time in the* JULIAN Period.

THE Year is divided into 12 Months, call'd Calendar Months, which neither anſwer to a Round of the Moon, nor to the Time that the Sun takes in moving thro' a 12th Part of the Zodiac, or round of the Sun, but were fill'd up at the different Times of altering the Calendar, to make the Year conſiſt of 365 Days, 6 Hours; therefore the Day of the Month can't point out the Moon's Age, without the Aſſiſtance of a Table.

There is the Periodical Month, or Time that the Moon takes in finiſhing her Round in the Heavens; but finding the Sun gone from the Place that ſhe left her, this can't

 be

be the Month of common Obſervation, that is, from one Full or New Moon to the next, which is call'd the Synodical Month, and is to be underſtood in our general ſpeaking of Lunar Months.

There is the Solar Month, or Time that the Sun takes in moving thro' a 12th Part of the Zodiac, but will leave theſe to Aſtronomers, whoſe proper Study it is, and ſpeak of the Synodical Month, as far as it concerns our preſent Purpoſe. The Quantity of the Synodical Month is not always the ſame; for in Summer, when the Sun ſeems to move ſlow, it is ſhort, and contains about 29 Days, 6 Hours, 42 Minutes, but in Winter, when the Sun ſeems to move faſt, the Moon does not fetch up the Sun ſo ſoon, which makes the Synodical Month greater, containing 29 Days, 19 Hours, 37 Minutes.

This Inequality of the Moon's Motion, obliges us to reckon by its mean Motion, taking one Month with another, whoſe Quantity according to the beſt Aſtronomers is 29 Days, 12 Hours, 44 Minutes, 3 Seconds, 9 Thirds; upon this Hypotheſis we have form'd our Tables, which will give you the Mean Quantity of the Moon's Age, at any Time in the *Julian* Period.

There are a great many Tables form'd by Aſtronomers to find the Moon's Age; but I truſt ours will be found as ſhort, as eaſy, and as general; at the ſame Time it will inform you how many Lunations any Number of Years contain, as likewiſe the Difference between the real or Aſtronomical, and the reputed or Metonic Epact.

R U L E.

Take from Table XV. the Lunations and Epacts for as many Years and Months as are elaps'd, from the Beginning of the *Julian* Period to the Time you ſeek for, adding the Radix at the Top of the Table to the ſaid Sum, (this Radix is the ſuppos'd Age of the Moon, the Day before the *Julian* Period began) the Remainder of the Epacts, after caſting off as many Lunations as are contain'd in them, will ſhew you the true Epact, or Moon's Age, reckon'd from Midnight *January* the Firſt.

EXAMPLE

EXAMPLE LVII.

What Time was it full Moon in *April*, in the Year of our Lord 326.

Find the Year of Bissextile.

4)326(2d after Leap Year.

81

Find the Year of the *Julian* Period.

Year of Christ given	326
Years add	4713
Year of the *Julian* Period	5039

Take out of Table XV. the Lunations and Epacts for 5038 Years, and from Table XVI. the Lunations and Epacts for *March* in a common Year, being the full Time elaps'd from the Beginning of the *Julian* Period, to the beginning of the Month sought, adding the Radix to this Sum.

Years	Lunations	Epacts Days.	Hours.	Min.
	Radix	19	2	
5000	61842	19	3	5
20	247	10	22	39
18	222	19	5	0
March	3	1	9	47
5038	62314	69	18	31
	2	59	1	28
	62316	10	17	3

After taking off from the Epacts as many Lunations as they contain, (which are 2) and adding them to the other Lunations, it appears, that on the last Day of *March*, in the Year of our Lord 326, there were 10 Days 17 Hours, 3 Minutes gone in the 62316th Lunation, since the Beginning of the *Julian* Period; so to find full

Moon in *April*, ſubſtract the Epact 10 Days, 17 Hours, 3 Minutes from a full Moon, or half a Lunation, and the Remainder will give you the Day and Hour in *April* that the full Moon happened.

	Days.	Hours.	Min.
Half a Lunation	14	18	22
Age of the Moon the laſt Day of March	10	17	3
Full Moon in *April*	4	1	19

The mean Time requir'd that full Moon happened is *April* the 4th at one in the Morning.

If nothing further than New or full Moon be ſought, you need not take out the Lunations, only the Epacts, with the Radix, and rejecting as many Lunations as there are in the Epacts, when added together, the Remainder gives you the Age of the Moon, the laſt Day of the preceding Month, which ſubſtracted from a whole Lunation when a New Moon is ſought, or half a Lunation if full Moon be wanted, (unleſs the Remainder be above half a Lunation, then you muſt ſubſtract it from a Lunation and a half to find the full Moon) and you have the Day and Hour in the Month requir'd.

EXAMPLE LVIII.

What Time was it New Moon in *January* in the Year of Chriſt 325.

Find what Year of the *Julian* Period.

Year of our Lord	325
Years add	4713
Year of the *Julian* Period.	5038

Take

Take out the Epacts.

		Days.	Hours.	Min.
	Radix	19	2	
Years.				
5000		19	3	5
20		10	22	39
17		8	13	48
5037		57	17	32
Cast off one Lunation		29	12	44
		28	4	48

This is the Age of the Moon the last Day in the preceding Year, so to find New Moon substract this Remainder from a Lunation.

	Days.	Hours.	Min.
A Lunation	29	12	44
Age of the Moon last Day of the preceding Month	28	4	48
New Moon in January	1	7	56

The mean Time of New Moon sought is January the first at 7 in the Morning.

For a Proof of this last Example find the Golden Number for the Year of our Lord 325.

19)5038(265
38
123
114
98
95

Golden Number 3

Consult

Consult the Calendar in our Common Prayer Books, where you'll find the Number 3 before the first of January, to denote the New Moon then happen'd, which must be right, as this was the Time the Golden Number was adjusted for.

EXAMPLE LIX.

The New Moon is sought for *January*, in the Year of Christ 1750.

Find the corresponding Year in the *Julian* Period.

Year of our Lord	1750
Years add	4713
Year of the *Julian* Period	6463

Take out the Epacts

	Days.	Hours.	Min.
Radix	19	2	0
6000	5	5	39
400	12	3	52
60	3	7	13
2	22	6	22
6462 Years	62	1	6
Cast off two Lunations	59	1	28
	2	23	38

	Days.	Hours.	Min.
One Lunation	29	12	44
Remainder	2	23	38
New Moon *January*	26	13	6

Substracting the Remainder from a Lunation, as New Moon was requir'd, it gives *January* the 26th, at one in the Afternoon, the mean Time of New Moon sought.

EXAMPLE

EXAMPLE LX.

The full Moon is ſought for *December*, in the Year of the *Julian* Period 4300.

Find whether it's a common or Leap Year, by ſubſtracting 1 and dividing by 4.

4300
1

4)4299(3d after Leap Year

1074

Take out the Epacts.

	Days.	Hours.	Min.
Radix	19	2	
4000	3	11	46
200	20	20	18
80	14	5	52
19	0	7	27
4299 Years			
November in a common Year	9	3	55
	67	3	18
Caſt off two Lunations	59	1	28
	8	1	50

The Remainder being the Age of the Moon, the laſt Day of *November*, ſubſtract it from half a Lunation, to find the full Moon in *December*.

	Days.	Hours.	Min.
Half a Lunation	14	18	22
Remainder	8	1	50
Full Moon in *December*	6	16	32

It gives you the 6th Day at four in the Afternoon, for the Time of Full Moon ſought.

EXAMPLE

EXAMPLE LXI.

The Full Moon is requir'd for *December*, in the Year of our Lord 1800.

Find whether it is a common or Leap Year.

4)1800(Leap Year

450

Find the Year of the Julian Period.

1800
4713

Year of the *Julian* Period 6513

Take out the Epacts.

		Days.	Hours.	Min.
	Radix	19	2	
6000		5	5	39
500		7	19	39
12		12	11	20
6512	*Nov.* in Leap Year	10	3	55
		54	18	33
	Cast off one Lunation	29	12	44
		25	5	49

As this Remainder or Age of the Moon the last Day of the preceding Month can't be substracted from half a Lunation, to find the next full Moon you must substract it from a Lunation and a half.

	Days.	Hours.	Min.
One and a Half Lunation	44	7	6
Remainder	25	5	49
	19	1	17

It gives *December* the 19th at one in the Morning the mean Time of full Moon sought.

EXAMPLE

EXAMPLE LXII.

What Time did the New Moon happen in January in the Year of Christ 342.

Find the Year of the *Julian* Period.

	342
	4713
Year of the *Julian* Period	5055

Take out the Epacts.

		Days.	Hours.	Min.
	Radix	19	2	
5000		19	3	5
40		21	21	18
14		5	4	58
5054		65	7	21
Cast off two Lunations		59	1	28
		6	5	53
One Lunation		29	12	44
Remainder		6	5	53
New Moon in January		23	6	51

Substracting the Remainder from a Lunation and it gives you *January* the 23d at 6 in the Morning, for the Time of New Moon requir'd.

EXAMPLE LXIII.

What Day was it New Moon in *January*, in the Year of our Lord 1748.

Find the Year of the *Julian* Period.

1748
4713
6461

Take

Take out the Epacts.

	Days.	Hours.	Min.
Radix	19	2	6
6000	5	5	39
400	12	3	52
60	3	7	13
6460	39	18	44
Cast off one Lunation	29	12	44
	10	6	0

	Days.	Hours.	Min.
A Lunation	29	12	44
Remainder	10	6	—
New Moon *January*	19	6	44

Substracting the Remainder from a Lunation it give *January* the 19th at 6 in the Morning, the Time requir'd

By these two last Examples may be further prov'd th Errors of the Golden Number, or Number of Directio as apply'd to the Calendar in the Common Prayer Book and were thought to point out the New Moons in eac Year so was the Foundation of the erroneous Observanc of *Easter* since that Time.

The Golden Number for the Year of Christ 342 mu be found by dividing the correspondent Year of the *Julia* Period by 19.

Year of Christ given	342
Years add	4713
Year of the *Julian* Period	5055

$$19)5055(266$$

38
125
114
115
114

Golden Number 1

Find the Golden Number for the Year of Christ 1748.

Year of our Lord given	1748
Years add	4713
Year of the *Julian* Period	6461

$$19)6461(340$$

57
76
76

Golden Number 1

It appears that the Number of Direction in both these Years are the same, and if the New Moons had come round exactly in 19 Years, the New Moon for both Years wou'd have happen'd on the same Day of the Month.

The New Moon in the Year of Christ 342 happen'd on *January* 23, as pointed out by the Number of Direction I. in the Calendar of our Common Prayer Books; but the New Moon for 1748, on *January* the 19th, that is 4 Days sooner.

EXAMPLE LXIV.

The full Moons are requir'd for each Month in the Year of our Lord 1750.

Find the Year of Biſſextile.

4)1750(2d after

437

Find the Year of the *Julian* Period.

Year of our Lord given	1750
Years add	4713
Year of the *Julian* Period	6463

Take out the Epacts.

	Days.	Hours.	Min.
Radix	19	2	—
6000	5	5	39
400	12	3	52
60	3	7	13
2	22	6	22
6462	62	1	6
Caſt off two Lunations	59	1	28
Moon's Age the laſt Day of the preceding Year; or, the Epact for the Year of our Lord 1750	2	23	38

To find the Full Moon in *January*.

Subſtract the Epact from half a Lunation.

	Days.	Hours.	Min.
Half a Lunation	14	18	22
Epact for the Year	2	23	38
	11	18	44

Full Moon *January* 11th at 6 at Night.

To find the Full Moon in *February*.

Add to the Epact for the Year the Epact for *Januar*[y] in a common Year, ſubſtracting this from half a Lunatio[n]

r if it be above half a Lunation from a Lunation and a half, the Remainder gives you the Time fought; observing always to cast off a Lunation as often as one occurs by any Addition of the Epacts.

	Days.	Hours.	Min.
Epact for the Year	2	23	38
January in a common Year	1	11	15
	4	10	53
Half a Lunation	14	18	22
Moon's Age last Day of *January*	4	10	53
	10	7	29

Full Moon *February* 10th at 7 in the Morning.

	Days.	Hours.	Min.
Epact for the Year	2	23	38
February in a common Year	29	11	15
	32	10	53
Cast off one Lunation	29	12	44
	2	22	9

	Days.	Hours.	Min.
Half a Lunation	14	18	22
Moon's Age last Day of *Feb.*	2	22	9
	11	20	13

Full Moon *March* 11th, at 8 at Night.

	Days.	Hours.	Min.
Epact for the Year	2	23	38
March in a common Year	1	9	47
	4	9	25

 Half

	Days.	Hours.	Min.
Half a Lunation	14	18	22
Moon's Age laſt Day of *March*	4	9	25
	10	8	57

Full Moon *April* 10th at 8 in the Morning.

	Days.	Hours.	Min.
Epact for the Year	2	23	38
April in a common Year	1	21	3
	4	20	41

	Days.	Hours.	Min.
Half a Lunation	14	18	22
Moon's Age laſt Day of *April*	4	20	41
	9	21	41

Full Moon *May* 9th at 9 at Night.

	Days.	Hours.	Min.
Epact for the Year	2	23	38
May in a common Year	3	8	19
	6	7	57
Half a Lunation	14	18	22
Moon's Age laſt Day of *May*	6	7	57
	8	10	25

Full Moon *June* 8th at 10 in the Morning.

	Days.	Hours.	Min.
Epact for the Year	2	23	38
June in a common Year	3	19	35
	6	19	13

Ha

	Days.	Hours.	Min.
Half a Lunation	14	18	22
Moon's Age laſt Day of *June*	6	19	13
	7	23	9

Full Moon *July* 7th, at 11 at Night.

	Days.	Hours.	Min.
Epact for the Year	2	23	38
July in a common Year	5	6	51
	8	6	29
Half a Lunation	14	18	22
Moon's Age laſt Day of *July*	8	6	29
	6	11	53

Full Moon *Auguſt* 6th, about Noon.

	Days.	Hours.	Min.
Epact for the Year	2	23	38
Auguſt in a common Year	6	18	7
	9	17	45
Half a Lunation	14	18	22
Moon's Age laſt Day of *Auguſt*	9	17	45
	5	0	37

Full Moon *September* 5th, ſoon in the Morning.

	Days.	Hours.	Min.
Epact for the Year	2	23	38
September in a common Year	7	5	23
	10	5	1

	Days.	Hours.	Min.
Half a Lunation	14	18	22
Moon's Age last Day of *September*	10	5	1
	4	13	21

Full Moon *October* 4th, at 1 in the Afternoon.

	Days.	Hours.	Min.
Epact for the Year	2	23	38
October in a common Year	8	16	39
	11	16	17
Half a Lunation	14	18	22
Moon's Age last Day of *October*	11	16	17
	3	2	5

Full Moon *November* 3d, at 2 in the Morning.

	Days.	Hours.	Min.
Epact for the Year	2	23	38
November in a common Year	9	3	55
	12	3	33
Half a Lunation	14	18	22
Moon's Age last Day of *November*	12	3	33
	2	14	49

Full Moon *December* the 2d, at 2 in the Afternoon.

What has been said of the Moon's Age, and the Examples that hath been shewn must be understood as the Mean Time of Moon's Age, not the apparent one, being sometimes over, sometimes short, of this last, by 14 Hours, occasion'd by the many Irregularities of the Moon's Motion. However, this Difference between the Mean and True Time does not increase with the Number of Years; for

for the Mean may prove as near the True Time a thousand Years hence, as it wou'd prove now: There wou'd be the same Objections against Clocks and Watches (for they give only the Mean, not the Apparent Time) as against these Tables.

Of the Times *of observing* PUBLIC FEASTS, *particularly* EASTER.

THE Church, at the first fixing their Feasts, it's very plain, had Regard to the Sun's Entrance into the principal Points of the Ecliptic.

As the *Annunciation*, was plac'd on the 25th of *March*, which was thought to be the Day of the Sun's Entrance into *Aries*; or, the *Vernal Equinox*.

The Feast of St. *John*, on the 24th of *June*, which was thought to be the Time of the *Summer Solstice*.

The Feast of St. *Michael*, on the 29th of *September*, which was thought to be the *Autumnal Equinox*.

And, the *Birth of Christ*, on the 25th of *December*, which was thought to be the *Winter Solstice*.

All which Feasts, by being fix'd to the Days of the Month, have alter'd from the Times that those, who first celebrated them, intended; were they to be observ'd according to the Time of the Sun's Entrance into those Points, they would correspond with the first Institution of them, and we shou'd have no Occasion to alter the Civil Year on their Account.

The Celebration of *Easter*, of all Feasts, hath caus'd the most Trouble, so many other Feasts depending upon it, and the Time of observing it being order'd, by the *Nicene Council*, to be determin'd by *Lunæ Solar* Motions, and no Round of them cou'd be found agreeable to the Length of the Year; from hence so great Confusion arose that determin'd Pope *Gregory* XIII. to alter the Civil Year on its Account, rather than differ from the Decree of that Council. This Alteration might have been prevented had it been only order'd, that *Easter* shou'd

ſhou'd be the Sunday upon, or following the firſt Full Moon after, the *Vernal Equinox*, (as was intended) and not after the 21ſt of *March*; this might have been found at any Time in the *Julian* Period without an Alteration of the Civil Year.

To find the Paſchal Full Moon, *and true Time of* EASTER.

THIS is only finding the next Full Moon after the Sun's Entrance into Aries or the Vernal Equinox, (which was evidently the Time the *Nicene* Council intended it to have been celebrated) and by applying that Time to the Calendar, find the Sunday, after which is *Eaſter* Day.

If the Full Moon falls on a Sunday, that Sunday is *Eaſter* Day.

RULE.

FIND by former Examples, the Time of the Sun's Entrance into the Vernal Equinox, in the Year requir'd; then find the Time of Full Moon in *March* for that Year, if it be after the Time of the Sun's Entrance into Aries, you have your Deſire; if before, add a whole Lunation to that Time, and it gives you the Paſchal Full Moon; after that find the Dominical Letter, and the Sunday upon, or after the Paſchal Full Moon, is the Day ſought.

EXAMPLE LXV.

When did the Paſchal Full Moon happen, in the Year of Chriſt 1698, and what Time ought *Eaſter* to have been celebrated.

Find the Year of Biſſextile, by dividing by 4

4)1698(2d after Leap Year

424

Take

Take out the Anticipation of the Equinoxes from Table V. for

	Days.	Hours.	Min.	Sec.
1000	7	16	10	0
600	4	14	30	0
90		16	34	30
7		1	17	21
1697 Years	13	0	31	51

The Anticipation ſubſtracted from the Radix, for the ſecond after Leap Year.

	Days.	Hours.	Min.	Sec.
Radix *March*	23	3	10	34
Anticipation	13	0	31	51
Sun in Aries *March*	10	2	38	43

gives the Time of the Sun's Entrance into the Vernal Equinox, to be *March* 10th, at two in the Morning.

Then find what Time it was full Moon in *March* 1698

	4713
Year of the *Julian* Period	6411

Take out of Table XV. the Epacts.

	Days.	Hours.	Min.
Radix	19	2	
6000	5	5	39
400	12	3	52
10	20	17	41
6410			
— *February* in a common Year	29	11	15
	86	16	27
Caſt off two Lunations	59	1	28
	27	14	59

This

This Remainder or Moon's Age, the laſt Day of *February* as it's more than a Full Moon, ſubſtract it from a Lunation and a half, and it gives you the Day in *March* the Full Moon happen'd.

	Days.	Hours.	Min.
One and a Half Lunation	44	7	6
Moon's Age laſt Day of *February*	27	14	59
Full Moon *March*	16th	16	7

That is on *March* the 16th, at 4 in the Afternoon, which being after the Time of the Sun's Entrance into Aries, is the Paſchal Full Moon ſought.

Find the Dominical Letter.

28)6411(228
56
81
56
251
224
Cycle of the Sun 27

Look in Table I. and even with the Cycle of the Sun 27, is the Dominical Letter B. Enter the Calendar with B, and even with the 16th, in the Month of *March*, is w, for Wedneſday, the Sunday following being the 20th, ſhould have been *Eaſter* Sunday.

EXAMPLE LXVI.

What Time did *Eaſter* happen in the Year of our Lord 400.

Find the Year of Biſſextile.

4)400(0 Leap Year.
100

Find

Find the Sun's Entrance into *Aries*.

Years.		Days.	Hours.	Min.	Sec.
300	Anticipation	2	7	15	0
90			16	34	30
9			1	39	27
399		3	1	28	57

	Days.	Hours.	Min.	Sec.
Radix for L. Year, *March*	22	15	10	34
Anticipation	3	1	28	57
Sun enter'd Aries *March*	19	13	41	37

Find the full Moon for *March* in the Year of our Lord 400.

		400
		4713
	Year of the *Julian* Period.	5113

		Days.	Hours.	Min.
	Radix	19	2	
5000		19	3	5
100		25	4	31
12		12	11	20
5112	*February* in Leap Year	0	22	31
		76	19	27
	Cast off two Lunations	59	1	28
	Age of the Moon last Day in *February*.	17	17	59

Substract the Remainder from a Lunation and a Half.

	Days.	Hours.	Min.
	44	7	6
Remainder	17	17	59
Full Moon *March*	26	13	7

It gives *March* the 26th, which, as it's after the Vernal Equinox, is the Paschal full Moon. Find

Find the Dominical Letters.

```
28)5113(182
   28
   ---
   231
   224
   ---
     73
     56
   ---
```

Solar Cycle 17

Dominical Letters according to Table I. are A. G.

Enter the Calendar, and in the Column G. in the Month of *March* even with the 26th, you find m for Monday; the Sunday after is the firſt of *April*, which was Eaſter Day that Year.

For a Proof, find the Golden Number.

```
19)5113(269
   38
   ---
   131
   114
   ---
    173
    171
   ---
```

Golden Number 2.

Enter the Paſchal Table Number 4. with the Dominical Letter G. and even with the Golden Number 2, you find *April* the firſt for Eaſter Day.

E X A M P L E LXVII.

What Time was Eaſter celebrated in the Year of Chriſt 325.

Find the Year of Biſſextile.

4)325(1ſt after Leap Year.

81

Take

Take out the Anticipation to find the *Vernal Equinox*.

	Days.	Hours.	Min.	Sec.
300	2	7	15	0
20	—	3	41	—
4	—	—	44	12
324	2	11	40	12
Radix for the first after Leap Year	22	21	10	34
Anticipation substract	2	11	40	12
Sun enter'd *Aries*, *March*	20	9	30	22

Find the Full Moon for *March*, in the Year of our Lord 325.

	325
	4713
Year of the *Julian Period*	5038

Take out the Epacts.

		Days.	Hours.	Min.
	Radix	19	2	—
5000		19	3	5
20		10	22	39
17		8	13	48
5037	*February* in a common Year	29	11	15
		87	4	47
Cast off two Lunations		59	1	28
Age of the Moon the last Day of *February*		28	3	19

Substract the Remainder from a Lunation and a Half, and it gives the Time of Full Moon in *March*.

	Days.	Hours.	Min.
One and a Half Lunation	44	7	6
	28	3	19
Full Moon *March*	16	3	47

This full Moon happen'd before the Vernal Equinox, fo can't be the Pafchal full Moon, to find which, add a Lunation to the foregoing Time, and it gives you the the Pafchal full Moon.

	Days.	Hours.	Min.
March	16	3	47
One Lunation	29	12	44
	45	16	31
Caft off 31 Days for *March*	31		
Full Moon *April*	14	16	31

The Time of Pafchal Full Moon is *April* 14th.

Find the Dominical Letters.

28)5038)179
28
223
196
278
252
Cycle of the Sun 26

The Cycle of the Sun being 26, the Dominical Letter by Table I. is C.

Enter the Calendar with C, and even with the 14th of *April* you find w. for Wednefday, the Sunday after which was Eafter Day was the 18th. Fo-

For a Proof find the Golden Number.

```
19)5038(265
   38
   ---
   123
   114
   ---
    98
    95
   ---
```

Golden Number 3

Enter Table IV. with the Dominical Letter C, and even with the Golden Number 3, you'll find Easter Day to be *April* 18th.

EXAMPLE LXVIII.

Easter Day is requir'd for the Year of our Lord 326.

Find the Year of Bissextile.

```
4)326(2d after Leap Year.
  81
```

Find the Time of the Vernal Equinox.

Years					
300		2	7	15	0
20			3	41	
5			0	55	15
325	Anticipation	2	11	51	15

	Days.	Hours.	Min.	Sec.
Radix for the 2d after Leap Year.	23	3	10	34
Anticipation	2	11	51	15
Sun enter'd Aries *March*	20	15	19	19

Find the Full Moon for *March* in the Year of our Lord 326.

	326
	4713
Julian Period	5039

Take out the Epacts.

	Days.	Hours.	Min.
Radix	19	2	
5000	19	3	5
20	10	22	39
18	19	5	0
5038 *Feb.* in a common Year	29	11	15
	97	19	59
Cast off three Lunations	88	14	12
Age of the Moon the last Day in *February*.	9	5	47

	Days.	Hours.	Min.
Half a Lunation	14	18	22
Remainder	9	5	47
Full Moon *March*	5th	12	35

This full Moon, as it's before the Vernal Equinox, can't be the Paschal full Moon, to find which, add a Lunation to this Time, and it gives you the Paschal full Moon.

	Days.	Hours.	Min.
March	5	12	35
A Lunation	29	12	44
	35	1	19
Take off 31 Days for *March*	31		
April	4	1	19

The mean Time of Paschal full Moon happen'd in the Night betwixt the 3d and 4th of *April*. Find

Find the Dominical Letter.

```
28)5039(179
   28
   ---
   223
   196
   ---
    279
    252
    ---
```

Cycle of the Sun - 27 Dominical Letter B.

Find the Golden Number.

```
19)5039(265
   38
   ---
   123
   114
   ---
     99
     95
     ---
```

Golden Number - 4

In the Paſchal Table even with the Golden Number ., in the Column B, you find *April* 3d for Eaſter Sun-ay. This was the Year after they had ſettled it, and hough the full Moon happen'd late of Sunday Night, or rather on Monday Morning, as the mean Time of ull Moon is *April* 4th at One in the Morning, yet by he Table they celebrated it on Sunday *April* the 3d, which ſufficiently proves that Note in our Common Prayer Book to be falſe, viz. if full Moon happens of a unday, Eaſter Day to be the Sunday after

Dr. *Wallis* in his Letter to Sir *John Blencowe*, of *May* he 14th, 1693, concerning the Obſervation of Eaſter, uppoſes this Note to have been inſerted through Miſtake. It certainly was either through Miſtake or Ignorance. I find it to have been firſt introduc'd into our Common

Prayer Books in the Year 1664, when a New Edition was printed by *John Bill*, and *Christopher Barker*; nor did this Note, at its first Appearance, pass unregarded, for Sir *George Wharton*, at that Time, prov'd it to be erroneous, notwithstanding which it has since continued.

EXAMPLE LXIX.

What Time did the Paschal full Moon happen in the Year of our Lord 1747, and what Time ought Easter to have been celebrated.

4)1747(3d after Leap Year

436

Find the Time of the Vernal Equinox.

		Days.	Hours.	Min.	Sec.
1000		7	16	10	0
700		5	8	55	0
40		0	7	22	0
6		0	1	6	18
1746	Anticipation	13	9	33	18

Substract this from the Radix for the 3d after Leap Year.

	Days.	Hours.	Min.	Sec.
Radix	23	9	10	34
Anticipation	13	9	33	18
Sun enter'd Aries *March*	9	23	37	16

Proceed to find the Full Moon in *March* 1747
4713

Year of the *Julian* Period 6460

Take

Take out the Epacts.

		Days.	Hours.	Min.
	Radix	19	2	
6000		5	5	39
400		12	3	52
40		21	21	18
19		0	7	27
6459	*Feb.* in a common Year	29	11	15
		88	3	31
	Cast off two Lunations	59	1	28
		29	2	3

Substract this Remainder from a Lunation and a half.

	Days.	Hours.	Min.
One and a Half Lunation	44	7	6
Remainder	29	2	3
Full Moon *March*	15th	5	3

As this Full Moon is after the Vernal Equinox, it proves to be the Paschal Full Moon; it likewise happened of a Sunday, so should have been *Easter* Day, but how widely it differ'd from the Time we did celebrate *Easter* this Year, which was on *April* 19th.

EXAMPLE LXX.

What Time should *Easter* have been celebrated in the Year of Christ 1748.

4)1748(0 Leap Year

437

Find

Find the Time of the Vernal Equinox.

		Days.	Hours.	Min.	Sec.
1000		7	16	10	0
700		5	8	55	0
40		0	7	22	0
7		0	1	17	21
1747	Anticipation	13	9	44	21

Substract this from the Radix for Leap Year.

	Days.	Hours.	Min.	Sec.
	22	15	10	34
Anticipation	13	9	44	21
Vernal Equinox *March*	9th	5	26	13

Find the Full Moon in *March*	1748
	4713
Year of the *Julian* Period	6461

Take out the Epacts

		Days.	Hours.	Min.
	Radix	19	2	
6000		5	5	39
400		12	3	52
60		3	7	13
		39	18	44
6460				
	February in Leap Year	0	22	31
		40	17	15
	Cast off one Lunation	29	12	44
		11	4	31

Substract

Substract the Remainder from half a Lunation.

	Days.	Hours.	Min.
	14	18	22
Remainder	11	4	31
Full Moon *March*	3	13	51

This Full Moon happening before the Vernal Equinox, can't be the Paschal Full Moon; to find which, add a Lunation to this last Time, and it gives you the Paschal Full Moon.

	Days.	Hours.	Min.
March	3	13	51
One Lunation	29	12	44
	33	2	35
Cast off 31 Days for *March*	31		
Full Moon *April*	2	2	35

Find the Dominical Letters.

28)6461(230
56
86
84

Cycle of the Sun 21 Dominical Letters C. B.

Enter the Calendar with B, and even with the Second Day is sa, for Saturday, the next Day being the first Sunday after the first Full Moon, that happened next after the Vernal Equinox, shou'd have been *Easter* Sunday.

EXAMPLE LXXI.

What Time does the Paschal Full Moon happen, in the Year of our Lord 1749.

4)1749(1st after Leap Year

437

Find

Find the Time of the Vernal Equinox.

	Days.	Hours.	Min.	Sec.
1000	7	16	10	0
700	5	8	55	0
40	0	7	22	0
8	0	1	28	24
1748 Anticipation	43	9	55	24

	Days.	Hours.	Min.	Sec.
Radix for the firſt after Leap Year	22	21	10	34
Anticipation	13	9	55	24
Vernal Equinox *March*	9	11	15	10

Find the Full Moon in *March* 1749
4713

Year of the *Julian Period* 6462

Years		Days.	Hours.	Min.	
	Radix	19	2	—	
6000		5	5	39	
400		12	3	52	
60		3	7	13	
1		11	15		11
6461	*February* in a common Year	29	11	15	
		80	21	10	
Caſt off two Lunations		59	1	28	
Moon's Age laſt Day of *February*		21	19	42	
One and a half Lunation		44	7	6	
Remainder		21	19	42	
Paſchal Full Moon *March*		22	11	24	

Find

Find the Dominical Letter.

28)6462(230

56

86
84

Cycle of the Sun 22 Dominical Letter A.

Enter the Calendar with A. and you'll find the 22d of *March* falls on a Wednesday, the Sunday after being the 26th is *Easter Day*.

This Year we shall celebrate *Easter* according to the Rule and Intention of the *Nicene Council*; for by the Table it happens on *March* the 26th.

EXAMPLE LXXII.

What Time ought *Easter* to be celebrated in the Year of *Christ* 1750?

4)1750(2d after Leap Year.

437

Find the Vernal Equinox.

		Days.	Hours.	Min.	Sec.
1000		7	16	10	—
700		5	8	55	—
40		—	7	22	—
9		—	1	39	27
1749	Anticipation	13	10	6	27
Radix for the second after Leap Year		23	3	10	34
Anticipation		13	10	6	27
Vernal Equinox *March*		9	17	4	7

Find

Find the Full Moon in *March* 1750.
4713

Year of the *Julian Period* 6463

		Days.	Hours.	Min.
Years	Radix	19	2	—
6000		5	5	39
400		12	3	52
60		3	7	13
2		22	6	22
6462	*February* in a common Year	29	11	15
		91	12	21
	Caſt off three Lunations	88	14	12
		2	22	9
	Half a Lunation	14	18	22
	Remainder	2	22	9
	Paſchal Full Moon *March*	11	20	13

Find the Dominical Letter.

28)6463(230
56
86
84

Cycle of the Sun 23 Dominical Letter G

Enter the Calendar with the Dominical Letter G where you find *March* the 11th happens of a Sunday th[is] Year, ſo ſhould be *Eaſter* Day, yet without an Altera-tion, it won't be celebrated till *April* 15th.

O

Of ECLIPSES.

THE Sun, the Earth and its Shadow, are always in a Line, and by the Earth's annual Motion ›und the Sun, form a Circle in the Heavens, call'd the cliptic; by reason, if the Moon happens to be in this ine at its Full or Change, there will then be an Eclipse: t the Change or Time of New Moon, it is an Eclipse f the Sun, the Moon being in the Ecliptic Line, be- vixt the Sun and the Earth, intercepts some of the Sun's ight from falling upon the Earth; when at Full it is an clipse of the Moon, the Moon being in the Ecliptic ine of the Shadow of the Earth, is hinder'd from re- eiving its Light from the Sun; now had the Motion of ie Moon been correspondent with the Plane of the E- liptic, there would have been an Eclipse every Full and hange of the Moon; but Astronomers have prov'd, iat in its Way round the Earth it cuts the Ecliptic Line nd passes 5 Degrees North, as likewise 5 Degrees South f this Line, so can't cause an Eclipse, but when the nterfection of the Ecliptic Line happens at the Full or hange of the Moon; the Points of Interfection are all'd the Nodes of the Moon: The Eclipses have, owever, their Period, consisting of 223 Lunations, hich is call'd the *Chaldean Saros*; after which Time is found, that the Eclipses come round again in the Or- er they did the *Saros* before. This is the Foundation f Table XVII, which is a Round of Ecliptic Lunations a *Chaldean Saros*. There may be two Eclipses in one unation; the first of the Sun at the Time of New Moon, or Beginning of a Lunation; the other of the Moon at the Full of the Moon, or Middle of the Lunation.

The Quantity of an Eclipse, as likewise the Places vhere visible, I shall leave to Astronomers who study the Motions of the Luminaries, as we do the Time in which hose Motions are made.

To find the ECLIPSES *by the* Chaldean Saros.

RULE.

TAKE out of Table XV. with the Radix, the Lunations and Epacts for the Time propos'd, adding to the Lunations as many as are contain'd in the Epacts; divide that Sum by 223, and the Remainder will be the current Lunation in the *Chaldean Saros*, which by Table XVII. you will know if it be an Ecliptic one.

Note: The Time of New Moon, is the Time of an Eclipse of the Sun, as Full Moon is the Time of an Eclipse of the Moon.

EXAMPLE LXXIII.

It is required, if there was an Eclipse of the Sun in *January*, in the Year of Christ 1513.

Year of our Lord given	1513
Years elaps'd add	4713
Year of the *Julian* Period	6226

Take out of Table XV. the Lunations and Epacts.

Years	Lunations	Days.	Hours.	Min.
	Radix	19	2	0
6000	74211	5	5	39
200	2473	20	20	18
20	247	10	22	39
5	61	25	15	12
6225		81	17	48
	2 Lunations	59	1	28
	76994	22	16	20

Divide

Divide the Number of Lunations by 223, and the Remainder will give you the current Lunation in a *Chaldean Saros.*

```
223)76994(345
    669
    ----
    1009
     892
    ----
     1174
     1115
     ----
Remainder  59
```

By this you find, that in the laſt Day of the Year of the *Julian* Period 6225, there was 22 Days, 16 Hours, 20 Minutes gone, in the 59th Lunation of a *Chaldean Saros*; ſo to find New Moon in *January*, ſubſtract the Moon's Age from a Lunation, and it gives the Time of the next new Moon.

Lunation		Days.	Hours.	Min.
1		29	12	44
59	Age of the Moon the End of the preceding Month	22	16	20
60	New Moon *January*	6th	20	24

So that on *January* 6th, at eight at Night, the Moon enter'd the 60th Lunation of a *Chaldean Saros*, and by Table XVII. this was no Eclipſe.

EXAMPLE LXXIV.

It is requir'd if there was an Eclipſe of the Moon in *February*, in the Year of Chriſt 1747.

Find the Year of Biſſextile.

```
4)1747( 3d after Leap Year
   436
```


Find

Find the Year of the *Julian* Period

1747
4713

6460

Take out the Lunations and Epacts.

Years		Radix Lunations	Days.	Hours.	Min.
			19	2	0
6000		74211	5	5	39
400		4947	12	3	52
40		494	21	21	18
19		235	0	7	27
6459	*Jan.* in a common Year	1	1	11	15
			60	3	31
	2 Lunations	2	59	1	28
		79890	1	2	3

Divide the Lunations by a *Chaldean Saros.*

223)79890(358

669

1299
1115

1840
1784

Current Lunation 56

You find that on the last Day of *January* the Moon wa[s]
Day. Hours. Min.
1 2 3 gone, in the 56th Lunation of a *Chal-dean Saros*; so to find Full Moon, substract that Remainder from half a Lunation, and you have the Time sought
Days

In Table XVII. you likewise find that the 98th Lunation is an Eclipse of the Sun, which is only half a Lunation from the full Moon of the 97th.

	Days.	Hours.	Min
97 and a Half happen'd *June*	8	10	25
Half a Lunation	14	18	22
98 *June*	23	4	47

The second is an Eclipse of the Sun *June* the 23d, about 4 in the Morning. You likewise find that the 103d Lunation is ecliptic; at the Beginning is an Eclipse of the Sun, at full an Eclipse of the Moon, to find which proceed as before.

	Lunations.	Days.	Hours.	Min.
Beginning of the Year	92	2	23	38
October in a common Year	10	8	16	39
	102	11	16	17

At the End of *October* there is 11 Days, 16 Hours, 17 Minutes gone of the 102d Lunation; to find the next new Moon, substract this Remainder from a Lunation, and it gives you the Day in *November* new Moon happen'd.

	Days.	Hours.	Min.
1 Lunation	29	12	44
102	11	16	17
103d began *November*	17th	20	27

The third Eclipse by this appears to be of the Sun *November* 17th, about 8 at Night.

To find the next full Moon, which is an ecliptic one, add half a Lunation to the above, and it gives you the Time.

Lunations

Lunation.		Days.	Hours.	Min.
103	*November*	17	20	27
Half a Lunation		14	18	22
		32	14	49
Take off 30 Days for *November*		30		
103 and a Half happen'd *December*		2	14	49

The 4th is an Eclipse of the Moon *December* the 2d, about two in the Afternoon.

You likewise find by the Table, that at the next new Moon is an Eclipse of the Sun, to find which, you must add Half a Lunation to the Time of the last full Moon.

	Days.	Hours.	Min
103 and a half happen'd *December*	2	14	49
Half a Lunation	14	18	22
104th began *December*	17th	9	11

Thus you find the 5th and last Eclipse to be of the Sun *December* 17th, about 9 in the Morning.

EXAMPLE LXXVI.

What Eclipses will there happen in the Year of our Lord 1800.

4)1800(Leap Year

450

1800
4713

Year of the *Julian* Period 6513

Days.

	Days.	Hours.	Min.
Half a Lunation	14	18	22
56 Age of the Moon last Day of *Jan.*	1	2	3
56 and a half; Full Moon *Feb.*	13	16	19

Look in Table XVII, and you'll find that the Full Moon of the 50th Lunation is Ecliptic, and this Year it happen'd in the Night, betwixt the 13th and 14th of *February*.

EXAMPLE LXXV.

What Eclipses will there happen, in the Year of our Lord 1750.

Find the Year of Bissextile.

4)1750(2d after Leap Year.

437

Find the corresponding Year in the *Julian* Period.

1750
4713

Year of the *Julian* Period 6463

Take out the Lunations and Epacts.

Years	Lunations	Days.	Hours.	Min.
	Radix	19	2	0
6000	74211	5	5	39
400	4947	12	3	52
60	742	3	7	13
2	24	22	6	22
6462		62	1	6
	2 Lunations	59	1	28
	79926	2	23	38

 Divide

Divide the Lunations by a *Chaldean* Saros.

223)79926(358

669

1302
1115

1876
1784

Current Lunation 92 in a *Chaldean* Saros.

The Moon's Age at the End of the preceding Year you find to be 2 Days, 23 Hours, 38 Minutes, gone in the 92d Lunation of a *Chaldean* Saros.

Enter Table XVII. to find what Lunations are Ecliptic, and you'll obſerve the 92d was an Eclipſe of the Sun, but this had happen'd at the Beginning of the Lunation, 2 or 3 Days before the Year commenc'd, ſo doth not belong to the Queſtion. The next to this is an Eclipſe of the Moon at the full of the 97th Lunation.

	Lunations	Days.	Hours.	Min.
Beginning of the Year	92	2	23	38
May in a common Year	5	3	8	19
	97	6	7	57

On the laſt Day of *May* the Moon was 6 Days, 7 Hours, 57 Minutes gone of the 97th Lunation, ſo to find full Moon ſubſtract this from half a Lunation.

	Days.	Hours.	Min.
Half a Lunation	14	18	22
97	6	7	57
97 and a Half; Full Moon *June*	8	10	25

The Firſt is an Eclipſe of the Moon *June* the 8th, about 10 in the Morning.

In

			Days.	Hours.	Mins
		Radix	19	2	0
Years.	Lunations.				
6000	74211		5	5	39
500	6184		7	19	39
12	148		12	11	20
6512			44	14	38
		1 Lunation	29	12	44
	223)80544(361		15	1	54

669

1364
1338

264
223

	Days.	Hours.	Min.
41	15	1	54

By Table XVII, you find, that 44 and a half, 45, 50 and a half, 51 Lunations in the *Chaldean Saros* are ecliptic, to find which, proceed as follows.

	Lunations.	Days.	Hours.	Min.
Last Day of the preceding Year	41	15	1	54
February in a Leap Year	2	0	22	31
	43	16	—	25

Substract this Moon's Age from a Lunation and a half.

Lunations.	Days.	Hours.	Min.
1 and a half	44	7	6
43	16	—	25
44 and a half happen'd *March*	28	6	41

The first Eclipse is of the Moon *March* 28th, about 6 in the Morning.

Last

	Lunations.	Days.	Hours.	Min.
Laſt Day of the preceding Year	41	15	1	54
March in Leap Year	3	2	9	47
	44	17	11	41
	1	29	12	44
End of *March*	44	17	11	41
	45 *April*	12	1	3

The ſecond is an Eclipſe of the Sun, *April* the 12th about One in the Morning.

	Lunations.	Days.	Hours.	Min.
Laſt Day of the preceding Year	41	15	1	54
Auguſt in a Leap Year	8	7	18	7
	49	22	20	1
Lunations.				
1 and a half		44	7	6
Moon's Age End of *Aug.* 49		22	20	1
50 and a half *Sept.*		21	11	5

The third is an Eclipſe of the Moon *September* the 21ſt about Noon.

Lunations.			
50 and a half *Sept.*	21	11	5
Half a Lunation	14	18	22
	36	5	27
Caſt off 30 Days for *September*	30		
51 *October*	6	5	27

The fourth and laſt is an Eclipſe of the Sun, *October* the 6th. about 5 in the Morning.

What

What was said before of the Difference between the mean Time of Full and New Moons, and the apparent One must likewise be consider'd in the Times of these Eclipses, we not pretending here to give the exact Time they happen, but only shew which Lunations are ecliptic and which not.

Though the Eclipses come round again in a *Chaldean Saros*, or Round of 223 Lunations, yet it is found that the Quantity is not the same; this Difference in a Number of Years shifts the Eclipse to the next Lunation, therefore this Manner of finding them can't be universal, only serving to compare Eclipses for 3 or 400 Years past, as likewise 3 or 400 Years to come; but that our Tables shou'd be more complete, I have added *Strauchius*'s Method of finding them for the whole *Julian Period*, after adjusting it to the Meridian of *London* and to the common Manner of Reckoning from Midnight, beginning the Year in *January*.

The Reader will observe that in the Table for finding the Moon's Age I have form'd my Radix so as to give the current Day of the Month on which Full or new Moon happen'd; to do this I was oblig'd to fix my Radix the Day before the *Julian Period* began, which makes it constantly give the Age of the Moon at the Beginning of the last Day of any Year or Month preceding the Time sought; that substracted from a Lunation gives the current Day the next New Moon falls on, and not the Time that is elaps'd in that Month, which would be one Day more than the current Time; as *January* 1 Day 12 Hours current, is *January* the First at Noon; this is only 12 Hours gone in that Year; but *January* 1 Day 12 Hours elaps'd would be the 2d Day at Noon, being a Day and a half gone in *January*.

Astronomers generally give the Time elaps'd, which, if our Readers think more proper, they must use the following Radixes.

	Days.	Hours.
Radix, or Age of the Moon at the Beginning of the *Julian Period* which will give the Time elaps'd in any Month that New or Full Moon falls on.	20	2

Radix

Radix to give the Time elaps'd, when the Equinox happens from the Beginning of the *Julian Period* reckon'd from Midnight the Firſt of *January*.

	Days.	Hours.	Min.	Sec.
Leap Year	117	19	9	13
Firſt after	117	1	9	13
Second after	117	7	9	13
Third after	117	13	9	13

Radix to give the Time elaps'd, when the *Vernal Equinox* happens for the Years from Chriſt, reckon'd from Midnight *January* the Firſt.

	Days.	Hours,	Min.	Sec.
Leap Year *March*	21	15	10	34
Firſt after	21	21	10	34
Second after	22	3	10	34
Third after	22	9	10	34

If you uſe the foregoing Radix to find the New Moon, it will give you the Age of the Moon the Beginning of the Year, or Month requir'd; that ſubſtracted from a Lunation will ſhew how many Days, Hours, &c. of that Month it will take to give the next Lunation or New Moon.

So likewiſe the Radix's for the Vernal Equinox, will give you the Days, Hours, and Minutes that are gone in the Month it happens in.

EXAMPLE LXXVII.

What Time will it be full Moon in *May* in the Year of our Lord 2418.

4)2418(2d after Leap Year.

604

2418
4713

Year of the *Julian Period* 7131

Radix

	Days.	Hours.	Min.
Radix to give the Time elaps'd	20	2	—
7000	20	20	58
100	25	4	31
20	10	22	39
10	20	17	41
7130 *April* in a common Year	1	21	3
	99	16	52
Cast off three Lunations	88	14	12
Age of the Moon Beginning of *May*	11	2	40
Half a Lunation	14	18	22
Age of the Moon Beginning of the Month	11	2	40
Time elapsed at Full Moon	3	15	42

The mean current Time of Full Moon is *May* the 4th, at 3 in the Afternoon.

EXAMPLE LXXVIII.

What Time will the Vernal Equinox happen in the Year of the *Julian Period* 6780 ?

1

4)6779(3d after Leap Year.

1694

Years.	Anticipation	Days.	Hours.	Min	Sec.
6000		46	1	—	—
700		5	8	55	—
70		—	12	3	52
9		—	1	39	27
6779		52	—	27	57
		1			Radix

	Days.	Hours.	Min.	Sec.
Radix for the third after Leap Year, to give the Time elapſed	117	13	9	13
Anticipation	52	—	27	57
	65	12	41	16
Caſt off 59 Days to *March*	59	—	—	—
Time elapſed in *March*	6	12	41	16

The current mean Time of the *Vernal Equinox* is *March* the 7th, 41 Minutes 16 Seconds after Noon.

EXAMPLE LXXIX.

What Time will the *Vernal Equinox* happen, in the Year of Chriſt 1760

4)1760(0 Leap Year:

440

Years.	Days.	Hours.	Min.	Sec.
1000	7	16	10	—
700	5	8	55	—
50	—	9	12	30
9	—	1	39	27
1759	13	11	56	57

	Days.	Hours.	Min.	Sec.
Radix for Leap Year to give the Time elapſed	21	15	10	34
Anticipation	13	11	56	57
Days elapſed in *March*	8	3	13	37

Sun enters *Aries*, *March* the 9th, 13 Minutes 37 Seconds after 3 in the Morning, current Time.

Before we proceed any further it's proper to acquaint our Readers of the different Times of Beginning the Day

and

and Year: The Civil Dav throughout *Europe* begins the Moment 12 o'Clock at Night is paſt; the Mathematicians begin theirs from Noon; however they don't agree about the Beginning of the Year, ſome being 12 Hours after the Civil Account, as *Tycho Brahe* and others, for they reckon from Noon, the Firſt of *January*; but the *Engliſh* Mathematicians and moſt of our Aſtronomical Tables are calculated from Noon, the laſt Day of *December*, ſo that theſe are 12 Hours before the Civil Account, and one Day before *Tycho*'s Reckoning.

Nothing can equal the Folly of our having two Beginnings of the Year, One from *January*, (whence all the reſt of *Europe* date their Civil Year) another from the *Annunciation*, on the 25th of *March*; but as I don't doubt this will be regulated very ſoon, that we may be ſo far conſiſtent as all to begin the Year at the ſame Time, therefore ſhall take no further Notice of it, than to inform you, that our Tables are ſuited to the Meridian of *London*, reckoning from Midnight beginning the Year on the Firſt of *January*.

Our Readers may, by altering the Radixes, bring their Time either from Noon or Midnight as they chuſe. The following Radixes will bring the Time as they are mentioned.

	Days.	Hours.
Radix to give the Current Day of the Month that New or Full Moon falls on, to be reckoned from Noon the laſt Day of *December*	18	14
Radix to give the Days elapſed in any Month that New or Full Moon falls on, to be reckoned from Noon the laſt Day of *December*	19	14
Radix to give the Current Day of the Month that New or Full Moon happens on, to be reckon'd from Noon, the Firſt of *January*	19	14
Radix to give the Days elapſed in any Month that New or Full Moon falls on, to be reckon'd from Noon the Firſt of *January*	20	14

RADIXES *to find the* VERNAL EQUINOX.

RADIX to give the Current Day of the Mont that the *Vernal Equinox* happens on, to be reckon from Noon the last Day of *December* for the Years fro the Beginning of the *Julian Period*.

	Days.	Hours.	Min.	Sec.
Leap Year	119	7	9	13
First after	118	13	9	13
Second after	118	19	9	13
Third after	119	1	9	13

Radix to give the Days elapsed at the Time of the *Ve nal Equinox*, to be reckon'd from Noon the last Day *December*, for the Years in the *Julian Period*.

	Days.	Hours.	Min.	Sec.
Leap Year	118	7	9	13
First after	117	13	9	13
Second after	117	19	9	13
Third after	118	1	9	13

Radix to give the Current Day of the Month that t *Vernal Equinox* happens on, to be reckon'd from No the First of *January*.

	Days.	Hours.	Min.	Sec
Leap Year	118	7	9	13
First after	117	13	9	13
Second after	117	19	9	13
Third after	118	1	9	13

Radix to give the Days elapsed at the Time of the *Ve nal Equinox*, to be reckon'd from Noon the First of *J nuary*, for the Years in the *Julian Period*.

	Days.	Hours.	Min.	Sec
Leap Year	117	7	9	13
First after	116	13	9	13
Second after	116	19	9	13
Third after	117	1	9	13

Rad

Radix to give the Current Day of the Month that the *Vernal Equinox* happens on, to be reckon'd from Noon the laſt Day of *December*, for the Years ſince Chriſt.

	Days.	Hours.	Min.	Sec.
Leap Year, *March*	23	3	10	34
Firſt after	23	9	10	34
Second after	23	15	10	34
Third after	23	21	10	34

Radix to give the Days elaps'd at the Time of the Vernal Equinox, to be reckoned from Noon the laſt Day of *December*, for the Years ſince Chriſt.

	Days.	Hours.	Min.	Sec.
Leap Year, *March*	22	3	10	34
Firſt after	22	9	10	34
Second after	22	15	10	34
Third after	22	21	10	34

Radix to give the current Day of the Month that the Vernal Equinox happens on, to be reckoned from Noon the firſt of *January*, for the Years ſince Chriſt.

	Days.	Hours.	Min.	Sec.
Leap Year, *March*	22	3	10	34
Firſt after	22	9	10	34
Second after	22	15	10	34
Third after	22	21	10	34

Radix to give the Days elaps'd at the Time of the Vernal Equinox, to be reckoned from Noon the firſt of *January*, for the Years ſince Chriſt.

	Days.	Hours.	Min.	Sec.
Leap Year *March*	21	3	10	34
Firſt after	21	9	10	34
Second after	21	15	10	34
Third after	21	21	10	34

To find the *Eclipses* in the *Julian* Peri-od, by the Mean Motions of the *Moon* and *Node*.

TO know if a Lunation be Ecliptic, find when th Full or New Moon happens in the Lunation pro pos'd; after that, take out of Tables XVIII, XIX XX, and XXI, the Mean Motions of the Moon and Nod for that Time, adding the Radix to this Sum, if the Re mainder when every 12 Signs are cast off, come within th Limits of Table XXII. there will then be an Eclipse; th

S ° '

nearer the Remainder is to the Center 0, 0, 0 or 6 Signs, the greater the Eclipse will be.

Astronomers divide the Ecliptic Line into twelve Parts call'd Signs, mark'd in the Tables with S, each Sig contains 30 Degrees mark'd °, each Degree 60 Minute or Firsts mark'd ', each First 60 Seconds mark'd '' each Second 60 Thirds mark'd ''', and so in addin Signs, Degrees, Firsts, Seconds, Thirds, you must fo every 60 Thirds, carry one Second; for every 60 Seconds carry one Minute; for every 60 Minutes, one Degree; fo every 30 Degrees, one Sign; and cast off every 12 Signs for a Revolution or whole Circle of the Ecliptic.

EXAMPLE LXXX.

It is requir'd, if there was an Eclipse of the Moon i *March*, in the Year of the *Julian* Period 4710.

Find the Year of Bissextile, by substracting one an dividing by 4.

4710
1
―――
4)4709(1st after Leap Year.
―――
1177

Fin

Find the Full Moon in MARCH.

	Days.	Hours.	Min.
Radix to give the Time elaps'd reckoned from Midnight	20	2	
4000	3	11	46
700	28	15	57
9	10	2	30
4709			
February in a common Year	29	11	15
	91	19	28
Cast off 3 Lunations	88	14	12
Age of the Moon beginning of MARCH	3	5	16

	Days.	Hours.	Min.
Half a Lunation	14	18	22
Age of the Moon beginning of March	3	5	16
Time elaps'd in MARCH when Full Moon happen'd	11	13	6

Take out of Tables XVIII, XIX, XX, and XXI, the Mean Motions of the Moon and Node for this Time.

		S	°	'	"
Radix		4	19	30	18
4000		1	11	7	48
700		7	4	11	52
9		9	28	6	16
4709 Years					
February in a common Year		2	0	31	53
Days in MARCH	11	4	25	31	22
Hours	13		7	9	57
Minutes	6			3	18
		30	6	12	44
Cast off two whole Circles		24			
		6	6	12	44

After

After casting off as many Revolutions as the Sum contains, it appears, that at the Time of Full Moon the mean Motions of the Moon and Node were 6 S 6° 12′ 44″ Enter Table XXII. where you'll find that this Full Moon was eclips'd, which by *Kepler* and *Petavius*, as likewise by *Whiston* in his Astronomical Lectures, is suppos'd to be the Eclipse mentioned by *Josephus*, to precede the Death of *Herod*; but *Scaliger* is of Opinion, that the Eclipse *Josephus* speaks of happen'd in *January*, in the Year of the *Julian Period* 4713. *Strauchius* joins with *Scaliger*, by reason the foregoing Eclipse was not considerable enough, as likewise not allowing sufficient Time for those Transactions, which the Historian mentions were done betwixt this Eclipse and the ensuing Passover.

EXAMPLE LXXXI.

It is sought if there was an Eclipse of the Moon in *January*, in the Year of the *Julian Period* 4713.

Find the Full Moon in *January* in the Year of the *Julian Period* 4713.

	Days.	Hours.	Min.
Radix to give the Time elaps'd reckon'd from Midnight.	20	2	
Years.			
4000	3	11	46
700	28	15	57
12	12	11	20
	64	17	3
Cast off two Lunations.	59	1	28
Age of the Moon beginning of *January*.	5	15	35
Half a Lunation.	14	18	22
Age of the Moon beginning of *January*.	5	15	35
Time elaps'd in *January* when Full Moon happen'd.	9	2	47

Take

Take out of Tables XVIII, XIX, XX, and XXI, the mean Motions of the Moon and Node for this Time.

			S	°	′	″
Years.		Radix	4	19	30	18
4000			1	11	7	48
700			7	4	11	52
12			0	24	14	36
Days	9		3	29	3	51
Hours.	2			1	6	9
Minutes.	47				25	54
			5	29	40	28

At this Full Moon the mean Motions of the Moon and Node were 5 S 29 ° 40 ′ 28 ″ which by Table XXII. muſt have been a very conſiderable Eclipſe, and in all Probability was that JOSEPHUS ſpeaks of.

Note, in taking out the Motion of the Moon and Node for Hours, Minutes, and Seconds, the Reader will obſerve, that the Product is in Quality, what is even with the Time mark'd at the Top of the Table, as

	°	′	″
20 Hours produces	11	1	28
	′	″	‴
20 Minutes produces	11	1	28
	″	‴	⁗
20 Seconds produces	11	1	28

EXAMPLE LXXXII.

It is requir'd if there was an Eclipſe of the Sun in MAY, in the Year before Chriſt 585.

Firſt Year of Chriſt was the Year of the *Julian Period.* 4714

From which take 585

Corresponding Year in the *Julian* Period. 4129

Find

Find the Year of Bissextile.

4129
1

4)4128(Leap Year.

1032

Find the Full Moon in MAY in the Year of the *Julian Period* 4129.

	Days.	Hours.	Min.
Radix to give the Days elaps'd, reckon'd from Midnight.	20	2	0
Years.			
4000	3	11	46
100	25	4	31
20	10	22	39
8	28	0	2
April in Leap Year.	2	21	3
	90	14	1
Cast off three Lunations.	88	14	12
Age of the Moon beginning of *May*	1	23	49
One Lunation	29	12	44
Age of the Moon beginning of *May*	1	23	49
Time elaps'd in *May* when New Moon happen'd.	27	12	55

Take out the mean Motions of the Moon and Node for this Time.

		S	°	′	″
Years.	Radix	4	19	30	18
4000		1	11	7	48
100		2	22	1	42
20		5	10	24	20
8		4	16	9	42
April in Leap Year.		5	10	45	6
Days in *May* 27		11	27	11	32
Hours 12			6	36	53
Minutes 55			0	30	19
		0	4	20	0

Enter

Enter Table XXII. and you'll find the Place of the Moon and Node within the Limits, so this New Moon was eclipsed; the mean current Time is *May* the 28th in the Afternoon.

This, by Sir *Isaac Newton* and others, is supposed to be the Eclipse mentioned by *Herodotus*, that happened during a Battle between the *Medes* and *Lydians*, and, as the same Historian says, was predicted by *Thales*.

EXAMPLE LXXXIII.

It is requir'd if there was an Eclipse of the Sun in *July*, in the Year of our Lord 1748.

Find the Year of Bissextile.

4)1748(0 Leap Year

437

Find the corresponding Year in the *Julian Period*.

	1748
	4713
Year of the *Julian Period*	6461

Find the Time of New Moon in *July*, in the Year of the *Julian Period* 6461.

	Days.	Hours.	Min.
Radix to give the Days elapsed	20	2	—
ears.			
000	5	5	39
00	12	3	52
60	3	7	13
60 *June* in a Leap Year	4	19	35
	45	14	19
ast off one Lunation	29	12	44
ge of the Moon Beginning of *July*	16	1	35

One

	Days.	Hours.	Min.
One Lunation	29	12	44
Age of the Moon Beginning of *July*	16	1	35
Time elapsed in *July*, when New Moon happened.	13	11	9

Take out the mean Motions of the Moon and Node for this Time.

		S	°	'	"
Years.	Radix	4	19	9	13
6000		8	1	41	42
400		10	28	6	47
60		4	1	13	1
6460	*June* in a Leap Year	8	7	44	31
Days in *July*	13	5	21	58	53
Hours	11	0	6	3	48
Minutes	9	0	0	4	57
		5	26	23	57

By Table XXII. this New Moon is ecliptic; the mean current Time of which happens *July* the 14th about 11 o'Clock in the Morning.

EXAMPLE LXXXIV.

It is required if there was an Eclipse of the Sun in *May* in the Year of Christ 1724.

Find the Year of Bissextile.

4)1724(0 Leap Year.

431

Find the corresponding Year in the *Julian Period.*

	1724
	4713
Year of the *Julian Period*	6437

Find

Find the New Noon in *May*, in the Year of the *Julian Period* 6437.

	Days.	Hours.	Min.
Radix to give the Time elapfed, reckoned from Midnight	20	2	—
Years.			
6000	5	5	39
400	12	3	52
20	10	22	39
16	26	11	21
6436 *April* in Leap Year	2	21	3
	77	18	34
Caft off two Lunations	59	1	28
Age of the Moon Beginning of *May*	18	17	6
One Lunation	29	12	44
Age of the Moon Beginning of *May*	18	17	6
Time elapfed in *May*, when New Moon happened	10	19	38

Take out the mean Motions of the Moon and Node for this Time.

		S	°	'	"
Years.	Radix	4	19	30	18
6000		8	1	41	42
400		10	28	6	47
20		5	10	24	20
16		9	2	19	28
6436 *April* in Leap Year		5	10	45	6
Days in *May*	10	4	12	17	36
Hours	19	0	10	28	24
Minutes	38	0	0	20	56
		0	5	54	37

By Table XXII. this New Moon comes within the Limits, so was ecliptic; the mean current Time of which happen'd *May* the 11th about 7 in the Evening.

EXAMPLE LXXXV.

In Dr. *Mead*'s Treatise concerning the Influence of the Sun and Moon upon human Bodies, translated by Dr. *Stack*, Page 69, is the following Passage: "What "happened *January* the 21st 1693, was very surprizing; "for the Moon having been eclipsed that Night, the "greatest Part of the sick died about the very Hour of "the Eclipse, and some were even struck with sudden "Death." It is required to find this Eclipse.

Find the Year of the *Julian Period.*	1693
	1347
Year of the *Julian Period*	6406

Find the Full Moon in *January* in the Year of the *Julian Period* 6406.

	Days.	Hours.	Min
Radix to give the Time elapsed, reckoned from Midnight *January* the 1st.	20	2	—
Years.			
6000	5	5	39
400	12	3	52
5	25	15	12
6405	63	2	43
Cast off two Lunations	59	1	28
Age of the Moon Beginning of *Jan.*	4	1	15
Half a Lunation.	14	18	22
Age of the Moon Beginning of *Jan.*	4	1	15
Time elapsed in *January* when Full Moon happened	10	17	7

Find

Finding the mean current Time of Full Moon this Year to be *January* the 11th, at 5 in the Evening, you imagine you have mistook the Year, and that the Author began his Year from *March*, this would make it in 1694 according to the Calculations of our Tables, we beginning the Year in *January*; for which Time find the Full Moon.

	1694		
	4713		
Year of the *Julian Period*	6407		
	Days.	Hours.	Min.
Radix to give the Time elapsed	20	2	—
Years.			
5000	5	5	39
400	12	3	52
6	6	17	40
6406	44	5	11
Cast off one Lunation	29	12	55
Age of the Moon Beginning of *Jan.*	14	16	27
Half a Lunation	14	18	22
Age of the Moon beginning of *Jan.*	14	16	27
Time elaps'd in *January*, when Full Moon happen'd	—	1	55

The mean current Time of Full Moon this Year is *January* the 1st at One in the Morning, so can't be the Time of the Eclipse mention'd: To solve this Difficulty we must observe it is a Quotation from *Rammazzini*, a Foreign Author, who must have begun his Year in *January* and have followed the New Stile Account, which then was 10 Days before Old Stile, this considered reduces the Time of Full Moon to *January* the 11th Old Stile.

Proceed to find if that Full Moon was eclipsed, by taking out the mean Motion of the Moon and Node for that Time.

Radix

			S	°	′	″
Years.	Radix		4	19	30	18
6000			8	1	41	42
400			10	28	6	47
5			1	20	1	24
Days	10		4	12	17	36
Hours	17		0	9	22	15
Minutes	7		0	0	3	51
			6	1	3	53

At this Full Moon was the Eclipse sought, the Mea[n] current Time of which happen'd *January* the 11th, a[t] five in the Evening.

Most English Readers, without some such Help as the[se] Tables, wou'd neither have known the Day or Year tha[t] such Occurrence had happen on, for they wou'd hav[e] imagin'd it to have been *January* the 21st 1693-4, whereas it happen'd *January* the 11th 1692-3.

This Manner of finding Eclipses, may serve sufficient ly true for Lunar ones, but Solar ones are not so certain for it may happen that at sometimes it will not answer, i[n] which Cases let Astronomers be consulted.

To find the Time of *Sun*'s rising, for an[y] Year in the *Julian* Period; Latitud[e] *London*.

THE Sun's rising is set down in our Calendar, a[s] agreeing with this Age, judging it more useful t[o] fix the Root from this Time, than any other. If th[e] Rising of the Sun be requir'd for any Year past, find wha[t] are the Number of Days of Anticipation out of Table V. for as many Years as are elaps'd from the Time given to the Year of our Lord 1700, or to the Year of the *Ju-lian* Period 6413. When you have found the Number o[f] Days of Anticipation, *substract* them from the Day of th[e] give[n]

Month given, and the Time of the Sun's rising in the Calendar that is even with the Day of the Month after such Substraction is made, will be the requir'd Time.

If the Time sought be after the above Root, proceed in the same Manner, only *add* such Number of Days of Anticipation to the given Time, and the Sun's rising in the Calendar, even with the Day of the Month, after such Addition is made, will be the Time sought.

EXAMPLE LXXXVI.

What Time did the Sun rise on the First of *January*, at the Beginning of the Christian Epocha.

From the Birth of Christ to our Root is 1700 Years, for which Number take out the Anticipation.

Years	Days.	Hours.	Min.
1000	7	16	10
700	5	8	55
1700	13	1	5

Substracting 13 Days from the First of *January*, it gives you the 19th of *December*, which shews that the Sun rose on the first of *January* then, at the Time it does now on the 19th of *December*, that is, about ten Minutes after eight.

EXAMPLE LXXXVII.

What Time did the Sun rise on *May-Day*, in the Year of the *Julian* Period 800.

Root	6413
Year given	800
	5613

From the Time given to our Root, is 5613 Years, for which Number take out the Anticipation.

Years	Days.	Hours.	Min.
5000	38	8	50
600	4	14	30
10		1	50
3			33
5613	43	1	43

Subſtracting 43, the Number of Days of Anticipation from *May-day*, you have the 19th of *March*, which ſhews you that the Sun roſe on *May-day* that Year, at the Time it does now on the 19th of *March*, which is about forty-two Minutes after five.

EXAMPLE LXXXVIII.

What Time will the Sun riſe on *Chriſtmas-day*, in the Year of our Lord 3700.

Year given	3700
Root	1700
	2000

From our Root to the Year given, are 2000 Years, for which Number take out the Anticipation.

Years	Days.	Hours.	Min.
2000	15	8	20

As this is after our Root, you muſt *add* the Days of Anticipation, and it gives you *January* the 9th. The Sun riſes on *January* the 9th, in our Calendar, about 50 Minutes after Seven, and that is the Time it will riſe on *Chriſtmas-day*, in the Year of our Lord 3700.

Of the COLURES.

THE Colures are great Circles drawn in the Heavens, at the Times of the Equinoxes and Solſtices paſſing thro' the Poles of the Equator, and cutting the Ecliptic where the Sun is at thoſe Times. The

The Tropical Year or Time that the Sun takes from one Vernal Colure to the next, consisting only of

Days. Hours. Min. Sec.

365 5 48 57 and the Sidereal Year, or Time that the Sun takes in going from one Place in the Heavens, till it arrives at the same Place again, consisting

Days. Hours. Min. Sec. ‴

of 365 6 9 14 30 it follows that the Colures must move backwards in the Heavens so far every

Min. Sec. ‴

Year, as will take the Sun 20 17 30 of Time, according to mean Motion in reaching the Place in the Heavens, where the Colure was form'd the Year before. To illustrate it, we will suppose the Sun to be in a certain Place in the Heavens, at Mid-Day, on the 10th of *March*, and at that Time to intersect our Equator so form the Vernal Equinox and Vernal Colure; four Years after this, the Sun would shine on our Equator, *March* 10th, 15 Minutes, 48 Seconds, after Eleven in the Morning, but would not reach the Place in the Heavens where he was when the Colure was form'd four Years before, till 36 Minutes, 58 Seconds, after 12. In these four Years, the Colures have moved backwards from the *Julian* Year, 44 Minutes, 12 Seconds; and the Sidereal Year hath moved forwards, 36 Minutes, 58 Seconds; which makes the Colures to have mov'd on the whole, 1 Hour, 21 Minutes, 10 Seconds. From hence may be deduced a good Argument for retaining the *Julian* Account, as being a very good Mean between the Tropical and Sidereal Years.

To find the COLURES.

RULE.

TAKE out of Table XXIV. the Precession of the Colures, for as many Years as are elaps'd from the Year given to the Year you are in, *add* these Number of Days &c. to the Time of the Vernal Equinox for the

the current Year, and the Product will give you the Time in that Year, when the Sun will be in the ſame Place in the Heavens that form'd the Colure the Year propos'd.

If you ſeek the Colure for any Time to come, you muſt *ſubſtract* the Preceſſion of the Colures from the Time of the Vernal Equinox for the current Year, and you have the Time in that Year when the Sun will be in the ſame Place, that will form the Colure the Year propos'd.

EXAMPLE LXXXIX.

In the Year of Chriſt 1748, it is required when the Sun was in that Place that form'd the Vernal Equinoctial Colure, at the Time of the *Argonautic* Expedition. *Sir* Iſaac Newton, *in his* Chronology, *Page* 91. *fixes the* Argonautic *Expedition* 937 Years before the Birth of Chriſt, this Number added to the Years elaps'd ſince Chriſt

$$\begin{array}{r} 1747 \\ 937 \\ \hline 2684 \end{array}$$

makes it 2684 Years ago, for which Number, take out of Table XXIV. the Preceſſion of the Colures.

Years.	Days.	Hours.	Min	Sec.
2000	28	4	23	20
600	8	10	55	—
80	1	3	3	20
4	—	1	21	10
2684	37	19	42	50

Add

	Days.	Hours.	Min.	Sec.
Add the Preceſſion of the Colures to the Time of the Vernal Equinox for the Year 1748, which by Example LXX. happen'd *March*	9	5	26	13
Preceſſion of the Colures	37	19	42	50
	47	1	9	3
Caſt off 31 Days for *March*	31			
April	16th	1	9	3

On *April* 16th at One in the Morning in the Year of Chriſt 1748, the Sun was in that Place where the Vernal Colure was form'd at the Time of the *Argonautic* Expedition.

EXAMPLE XC.

In the Year of our Lord 1750 it is requir'd at what Time the Sun will be in that Place that form'd the Vernal Equinoctical Colure in *Eudoxus*'s Time.

Eudoxus flouriſh'd in the Year before Chriſt	363
Years ſince	1749
	2112

For which Number take out of Table XXIV. the Preceſſion of the Colres.

Years.	Days.	Hours.	Min.	Sec.
2000	28	4	23	20
100	1	9	49	10
10	—	3	22	55
2	—	—	40	35
2112 Preceſſion of the Colures	29	18	16	—

Find

Find the Time of the Vernal Equinox.

4)1750(2d after Leap Year.

437

Take out of Table V. the Anticipation of the Equinoxes for 1749 Years.

Years.		Days.	Hours.	Min.	Sec.
1000		7	16	10	—
700		5	8	55	—
40		—	7	22	—
9		—	1	39	27
1749	Anticipation.	13	10	6	27

Subftract the Anticipation from the Radix for the second after Leap Year.

		Days.	Hours.	Min.	Sec.
Radix	*March*	23	3	10	34
Anticipation		13	10	6	27
Sun in Aries *March*		9	17	4	7

To the Time of the Sun's Entrance into Aries, add the Preceffion of the Colures.

	Days.	Hours.	Min.	Sec.
Sun in Aries *March*	9	17	4	7
Preceffion of the Colures	29	18	16	0
	39	11	20	7
Caft off 31 Days for *March*	31			
April	8	11	20	7

On *April* 8th, 20 Minutes paft 11 in the Morning, in the Year of Chrift 1750, the Sun will be in that Place that form'd the Vernal Colure in *Eudoxus*'s Time

EXAMPLE

EXAMPLE XCI.

In the Year of our Lord 1749, it is requir'd, when the Sun will be in that Place that form'd the Vernal Colure, at the Beginning of the Chriſtian Epocha.

Take out the Preceſſion of the Colures.

Years.		Days.	Hours.	Min.	Sec.
1000		14	2	11	40
700		9	20	44	10
40		—	13	31	40
8		—	2	42	20
1748	Preceſſion of the Colures	24	15	9	50

Find the Time of the Vernal Equinox.

4)1749(1ſt after Leap Year.

437

Take out of Table V. the Anticipation of the Equinoxes.

		Days.	Hours.	Min.	Sec.
1000		7	16	10	—
700		5	8	55	—
40		—	7	22	—
8		—	1	28	24
1748	Anticipation	13	9	55	24

Subſtract the Anticipation from the Radix for the firſt after Leap Year.

Radix

	Days.	Hours.	Min.	Sec.
Radix	22	21	10	34
Anticipation	13	9	55	24
Sun in Aries *March*	9	11	15	10

Add the Preceſſion of the Colures to the Time of the Sun's Entrance into Aries.

	Days.	Hours.	Min.	Sec.
Time of the Vernal Equinox	9	11	15	10
Preceſſion of the Colures	24	15	9	50
	34	2	25	0
Caſt off 31 Days for *March*	31			
April	3	2	25	—

On *April* the 3d at two in the Morning, the Sun will be in the ſame Place as form'd the Vernal Colure at the Birth of Chriſt.

EXAMPLE XCII.

In the Year of our Lord 1749, it is requir'd when the Sun will be in the ſame Place that will make the Vernal Colure in the Year of Chriſt 2000

2000
1749
251

From the Year given to the Year ſought is 251 Years for which Number take out the Preceſſion of the Colures

Years.		Days.	Hours.	Min.	Sec.	T.
200		2	19	38	20	—
50		—	16	54	35	—
1		—	—	20	17	30
251	Preceſſion	3	12	53	12	30

Fin-

	Days.	Hours.	Min.	Sec.
Find the Vernal Equinox for this Year, which by the last Example you know to be *March*	9	11	15	10

As the Time sought is after the Year given, you must *substract* the Precession of the Colures from the Time of the Vernal Equinox.

	Days.	Hours.	Min.	Sec.	‴
Sun in Aries *March*	9	11	15	10	—
Precession substract	3	12	53	12	30
March	5	22	21	57	30

On *March* the 5th at 10 at Night in the Year of our Lord 1749, the Sun will be in that Place that will form the Vernal Colure in the Year of Christ 2000.

Of the SOLSTICES.

THE Solstices are those Points in the Ecliptic, when the Sun is at the greatest Distance from our Equator, and makes the longest or shortest Day to the Inhabitants of this Globe. When North of the Equator it makes the longest Day to all on the North Side, and with us is call'd the Summer Solstice; when on the South Side the Equator it makes the shortest Day to the Inhabitants on the North Side, and is our Winter Solstice. Now as the Equinoxes or Intersection of the Equator and Ecliptic move backwards in the *Julian* Year, so must the Solstices at the same Rate, which as shown before is 11 Minutes 3 Seconds per Annum.

The Reason is very obvious; for the tropical Year being 11 Minutes 3 Seconds less than the mean *Julian* Year, and the *Julian* Year being our fix'd Standard of

Time, the Tropical Year muſt move backwards ſo much every Year as it is ſhort of the reputed Meaſure; and by Reaſon of our having only 365 Days for 3 Years, and 366 Days for the 4th; the ſame Irregularity attends the Solſtices as the Equinoxes;—however by the Help of Radixes, they may be adjuſted to the *Julian* Standard.

To find the SOLSTICES, as likewiſe the *Autumnal Equinox*, for any Year in the *Julian Period.*

RULE.

TAKE out of Table V. the Anticipation for as many Years as are elaps'd ſince Chriſt. Subſtract this Sum from the Radix anſwering to the Year you ſeek for, whether Leap Year, Firſt, Second, or Third after, and you have the Time requir'd. Note, if the Time ſought be before Chriſt, take out the Anticipation for as many Years as it is before Chriſt's Birth, and *add* ſuch Number to the Radix for the Year you ſeek for, whether Leap Year, Firſt, Second, or Third after.

Radixes for the Summer Solſtice.

	Days.	Hours.	Min.	Sec.
Leap Year *June*	23	13	56	37
Firſt after.	23	19	56	37
Second after.	24	1	56	37
Third after.	24	7	56	37

Radixes for the Autumnal Equinox.

	Days.	Hours.	Min.	Sec.
Leap Year *September*	25	3	24	4
Firſt after	25	9	24	4
Second after	25	15	24	4
Third after	25	21	24	4

Radixes

Radixes for the Winter Solſtice.

	Days.	Hours.	Min	Sec.
Leap Year *December*	23	19	50	43
Firſt after	24	1	50	43
Second after	24	7	50	43
Third after	24	13	50	43

EXAMPLE XCIII.

What Time does the Summer Solſtice happen in the Year of our Lord 1780.

Find the Year of Biſſextile.

4)1780(0 Leap Year.

445

Take out of Table V. the Anticipation for 1779 Years being the Number of Years elapſ'd from the Beginning of the Chriſtian Epocha to the Year ſought.

Years.	Days.	Hours.	Min.	Sec.
1000	7	16	10	0
700	5	8	55	0
70	0	12	53	30
9	0	1	39	27
1779	13	15	37	57

Subſtract the Anticipation from the Radix, anſwering to the current Year, which you find to be Leap Year.

Radix for the Summer Solſtice.

	Days.	Hours.	Min.	Sec.
Leap Year, *June*	23	13	56	37
Anticipation ſubſtract	13	15	37	57
June	9	22	18	40

The Time of Summer Solſtice is *June* the 9th, after ten at Night.

EXAMPLE XCIV.

It is requir'd what Time the Summer Solstice happen'd in the Year of the *Julian Period* 4519.

Find the Year of Bissextile, by substracting 1, and dividing by 4.

4519
1

4)4518(2d after Leap Year.

1129

Find how many Years before Christ.

The First Year of Christ was the Year of the *Julian Period*	4714
Year given	4519
Years before Christ	195

For which Number take out of Table V. the Anticipation.

Years	Days.	Hours.	Min.	Sec.
100	0	18	25	0
90	0	16	34	30
5	0	0	55	15
195	1	11	54	45

As the Year sought is *before* Christ, by the Rule you must *add* the Anticipation to the Radix for the current Year, which you know to be the Second after Leap Year.

	Days.	Hours.	Min.	Sec.
Radix for the Summer Solstice Second after Leap Year *June*	24	1	56	37
Anticipation *add*	1	11	54	45
June	25	13	51	22

The Time of the Summer Solstice 195 Years before Christ, was *June* the 25th, at one in the Afternoon.

EXAMPLE

EXAMPLE XCV.

What Time will the Autumnal Equinox happen in the Year of our Lord 1893.

Find the Year of Biſſextile.

4)1893(1ſt after Leap Year.

473

Take out of Table V. the Anticipation of the Equinoxes, for as many Years as are elaps'd ſince Chriſt.

Years	Days.	Hours.	Min.	Sec.
1000	7	16	10	0
800	6	3	20	0
90	0	16	34	30
2	0	0	22	6
1892	14	12	26	36

Subſtract the Anticipation from the Radix for the Firſt after Leap Year.

	Days.	Hours.	Min.	Sec.
Radix for the Autumnal Equinox, the Firſt after Leap Year, *September*	25	9	24	4
Anticipation ſubſtract	14	12	26	36
September	10	20	57	28

Sun enters the Autumnal Equinox *September* the 10th, at eight at Night.

EXAMPLE XCVI.

What Time did the Autumnal Equinox happen 700 Years before Chriſt.

Find the Year of the *Julian Period.*

Firſt Year of Chriſt was the Year of the *Julian Period*	4714
From which take	700
Year of the *Julian Period*	4014

L 3 Find

Find the Year of Biſſextile, by ſubſtracting 1, and dividing by 4.

4014
1
4)4013(1ſt after Leap Year.
1003

Take out of Table V. the Anticipation for as many Years as it was before Chriſt.

Years	Days.	Hours.	Min.	Sec.
700	5	8	55	0

As the Year ſought was before Chriſt, you muſt *add* the Anticipation to the Radix for the current Year, which was the Firſt after Leap Year.

	Days.	Hours.	Min.	Sec.
Radix for the Autumnal Equinox, the Firſt after Leap Year *September*	25	9	24	4
Anticipation *add*	5	8	55	0
September	30	18	19	4

The Sun enter'd the Autumnal Equinox the Year propos'd on *September* the 30th, at ſix in the Evening.

EXAMPLE XCVII.

What Time does the Winter Solſtice happen in the Year of our Lord 1750.

Find the Year of Biſſextile.

4)1750(2d after Leap Year.
437

Take

Take out of Table V. the Anticipation for as many Years as are elaps'd, from the Beginning of Chrift to the Year fought.

Years.	Days.	Hours.	Min.	Sec.
1000	7	16	10	0
700	5	8	55	0
40	0	7	22	0
9	0	1	39	27
1749	13	10	6	27

Subftract the Anticipation from the Radix, anfwering to the current Year, which is the fecond after Leap Year,

	Days.	Hours.	Min.	Sec.
Radix for the Winter Solftice the fecond after Leap Year, *December*	24	7	50	43
Anticipation fubftract	13	10	6	27
December	10	21	44	16

The Time of the Winter Solftice, in the Year of our Lord 1750, is *December* the 10th, at nine at Night.

EXAMPLE XCVIII.

What Time did the Winter Solftice happen, the Year of the Paffion, being the Year of our Lord 33.

Find the Year of Biffextile.

4)33(1ft after Leap Year.

8

Take out of Table V. the Anticipation for as many Years as were elaps'd fince Chrift.

Years.	Days.	Hours.	Min.	Sec.
30	0	5	31	30
2	0	0	22	6
32	0	5	53	36

Subftract

Subſtract the Anticipation from the Radix, anſwering to the Year ſought, which was the firſt after Leap Year.

	Days.	Hours.	Min.	Sec.
Radix for the Winter Solſtice the firſt after Leap Year, *December*	24	1	50	43
Anticipation ſubſtract	0	5	53	36
December	23	19	57	7

The Time of the Winter Solſtice, the Year of the Paſſion, was *December* the 23d, at ſeven at Night.

EXAMPLE XCIX.

What Time did the Winter Solſtice happen, in the Year of the *Julian Period* 4587.

Find the Year of Biſſextile.

4587
1

4)4586(2d after Leap Year.

1146

Find how many Years before Chriſt.

Firſt Year of Chriſt was the Year of the *Julian Period*	4714
Year given	4587
Years before Chriſt	127

Take out of Table V. the Anticipation for as many Years as before Chriſt.

Years.	Days.	Hours.	Min.	Sec.
100	0	18	25	0
20	0	3	41	0
7	0	1	17	21
127	0	23	23	21

A

As the Year fought was before Chrift, you muft *add* the Anticipation to the Radix anfwering to the current Year, which is found to have been the fecond after Leap Year.

	Days.	Hours.	Min.	Sec.
Radix for the Winter Solftice, the fecond after Leap Year, *December*	24	7	50	43
Anticipation *add*	0	23	23	21
December	25	7	14	4

The Time of Winter Solftice 127 Years before Chrift, was *December* the 25th at 7 in the Morning.

With the Help of thefe Tables we can call back paft Ages, bring as it were the Field of Action before our Eyes, fo be more enabled to judge of the Truth of Hiftorians Defcriptions, by comparing the Diftances, and obferving if they fill up the Spaces of Time juftly.

Of the 500 Years ready calculated.

TO make thefe Tables of immediate Ufe, there are the Dominical Letters, Epact and Eafter Day ready calculated for 500 Years, viz. from the Year of our Lord 1501, to 2000 inclufive, whofe Ufe is as follows.

Enter the Months in the Calendar with the Dominical Letter that is even with the Year fought, and you have an Almanack for that Year. When there are two Dominical Letters it is then Leap Year, the firft ferves for *January* and *February*, the other for the reft of the Year.

EXAMPLE C.

What Day of the Month was the Second Sunday in *July* in the Year of our Lord 1501.

Even with 1501 is the Dominical Letter C, look in the

the Month *July*, and in the Column C you'll find th
Second S to be even with the 11th Day of the Month.

EXAMPLE CI.

What Day of the Week will the 30th of *Janua*
happen on in the Year of our Lord 1996.

Even with that Year of our Lord are the Dominic
Letters A. G, enter *January* with A the first of th
Dominical Letters, and in that Column even with th
30th, is m for Monday.

By the Epact, you have a ready Way of finding th
Moon's Age exact enough for common Use.

RULE.

Add the Epact and Day of the Month together, wi
the Sum for as many Months as you are past *March* in
clusive; if such Sum exceeds 30, cast 30 off for a Mont
and the Remainder is the Moon's Age.

For *January* you add the Epact and Day of the Mon
only; for *February* you add the Epact, Day of th
Month, and the Number 2.

Note: You may reckon the Moon at full when 1
Days old, and the Quarters in Proportion.

EXAMPLE CII.

The Age of the Moon is requir'd for the 2d Day o
December in the Year of our Lord 1750.

Even with this Year of our Lord is the Epact 3, t
which add 2 for the Day of the Month, makes 5, an
10 (*December* being the 10th Month from *March* inclu
five) makes the Moon's Age 15 Days or full Moon, a
the Time requir'd.

EXAMPLE CIII.

The New Moon is requir'd for *February* in the Ye
of our Lord 1760.

Eve

Even with the Year of our Lord given is the Epact 3, to which add 2 for the Month makes 25, so the New Moon will be about the 5th Day of the Month.

Knowing Easter Sunday by the Table of Moveable Feasts at the End of the Calendar, any other Moveable Feast is easily found.

EXAMPLE CIV.

What Time did Whit-Sunday happen in the Year of our Lord 1679

Overagainst the Year of our Lord given, Easter Day is *April* 20. In the Table of Moveable Feasts even with Easter-Day of *April* 20th, is *June* the 8th for Whit-Sunday, the Time requir'd.

EXAMPLE CV.

What Time will Ascension Day happen in the Year of our Lord 1901.

Even with that Year of our Lord is *April* 1st for Easter Sunday.

In the Table of Moveable Feasts overagainst Easter Day of *April* 1st, you have *May* the 10th, which will be Ascension Day that Year.

EXAMPLE CVI.

It is requir'd what Day of the Month the first Sunday after the 8th of *April* will happen on, in the Year of our Lord 1770.

Even with the Year of our Lord given is the Dominical Letter C. Enter the Calendar, and in the Month of *April* down the Column C, even with the 8th, you find th for Thursday, the Sunday after will be the 11th.

EXAMPLE CVII.

The Age of the Moon is requir'd for the 2d of *February* in the Year of our Lord 1754-5.

As

†NB. For the 100th years not Bissextile N.S. the last Letter of the O.S. is to be used

As we begin the Year in our Tables the first of *Ja-nuary*, this must be reckon'd the Year of our Lord 175
Even with this Year you find the Epact 28, to whic add 2 for the Month, and 2 for the Day of the Mont makes 32, cast off 30 for a Month, and you have th Moon's Age 2 Days at the Time requir'd.

EXAMPLE CVIII.

What Time will Ash Wednesday happen on, in th Year of our Lord 1760.

Even with 1760 you find Easter Day to be *Marc* the 26th. Enter the Table of Moveable Feasts, and o veragainst Easter Day of *March* 26, you find Ash Wed nesday to be *February* the 8th.

Now as the Year given is Leap Year, and the Fea sought happening in *February*, by a Note at the Botton of the Table it must be one Day later, that is *Februa* the 9th.

To find the Sunday Letter New Stile in the ensuing Tables.

To the Number of the Days by wch the Stiles differ add the Index of the Sunday Letter in the Tables, counting G. A. 1. B. 2. C. 3. &c. the Sum, casting away the sevens) is the Index of the Sunday Letter N.S. †

THE

This Addition compleats one Dionysian Period

Years	Dom. Lett.	Epact	Easter	day	
1469	A	17	April	2	
1470	G	28	.	22	1470
1471	F	9	.	14	
1472	E D	20	Mar.	29	940
1473	C	1	April	18	
1474	B	12	.	10	410
1475	A	23	March	26	
1476	G F	4	April	14	
1477	E	15	. .	6	
1478	D	26	March	22	
1479	C	7	April	11	
1480	B A	18	.	2	
1481	G	29	. .	22	
1482	F	11	.	7	950
1483	E	22	March	30	
1484	D C	3	April	18	420

The Addition wch compleats one Dionysian Period

	Years	Dom. Lett.	Epact	Easter day	
	1485	B	14	April	3
	1486	A	25	March	26
	1487	G	6	April	15
	1488	F E	17	. .	6
	1489	D	28	. .	19
	1490	C	9	. . .	11
	1491	B	20	. . .	3
960	1492	A G	1	. .	22
	1493	F	12	.	7
430	1494	E	23	March	30
	1495	D	4	April	19
	1496	C B	15	.	3
	1497	A	26	March	26
	1498	G	7	April	13
	1499	F	18	March	31
	1500	E D	29	April	19